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THE MARINE CORPS GAZETTE

MARCH 1940

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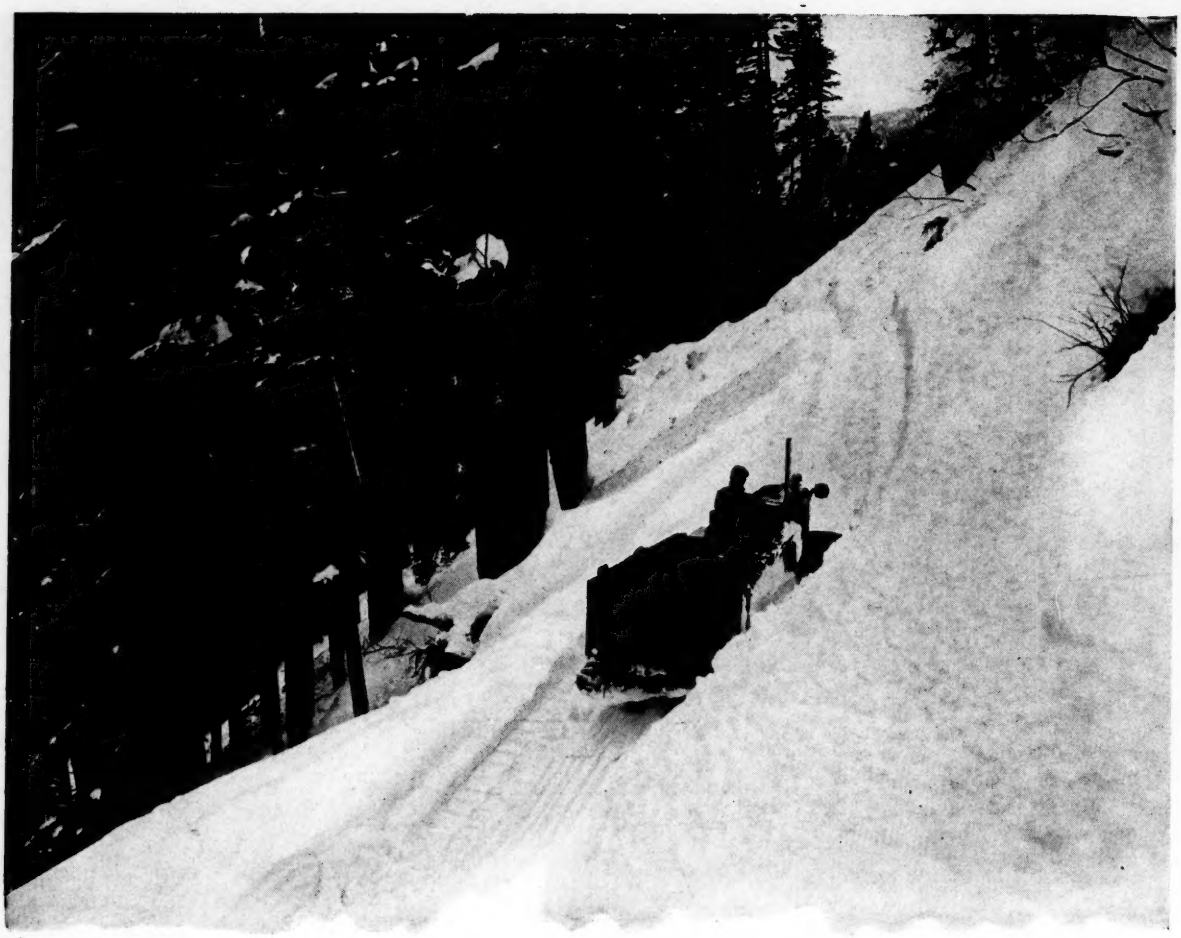

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ROBERT SISK
Directed by GEORGE NICHOLLS, Jr. and BEN STOLOFF

Screen Play by Jerry Cady and Lieut. Commander A. J. Bolton

THE MARINE CORPS GAZETTE

WASHINGTON, D. C.

Vol. 24 MARCH, 1940 No. 1

CONTENTS

HILTON HEAD MARINES 5

THE AIRSHIP: STEP-CHILD OF OUR NATIONAL DEFENSE 9

MARINE CORPS ADVANCE FLIGHT SCHOOL 14

THE ADMIRAL GRAF SPEE 16

SCOUTS! INFORMATION PLEASE 22

MILITARY LESSONS FROM THE CHINESE-JAPANESE WAR 24

ADMIRAL BYRD HEADS SOUTH AGAIN 36

A REVIEW OF CAMOUFLAGE LITERATURE 40

THE MARINE RIFLE COMPANY IN STREET RIOT OPERATIONS 49

RESERVE AFFAIRS 54

FIRE EFFECT 58

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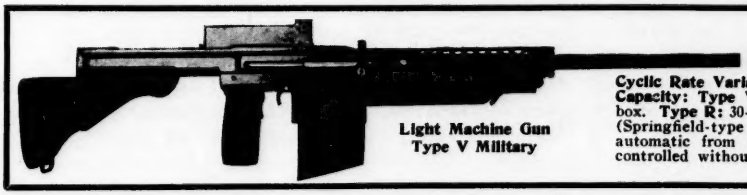

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THE MARINE CORPS GAZETTE

Vol. 24 MARCH, 1940 No. 1

HILTON HEAD MARINES:

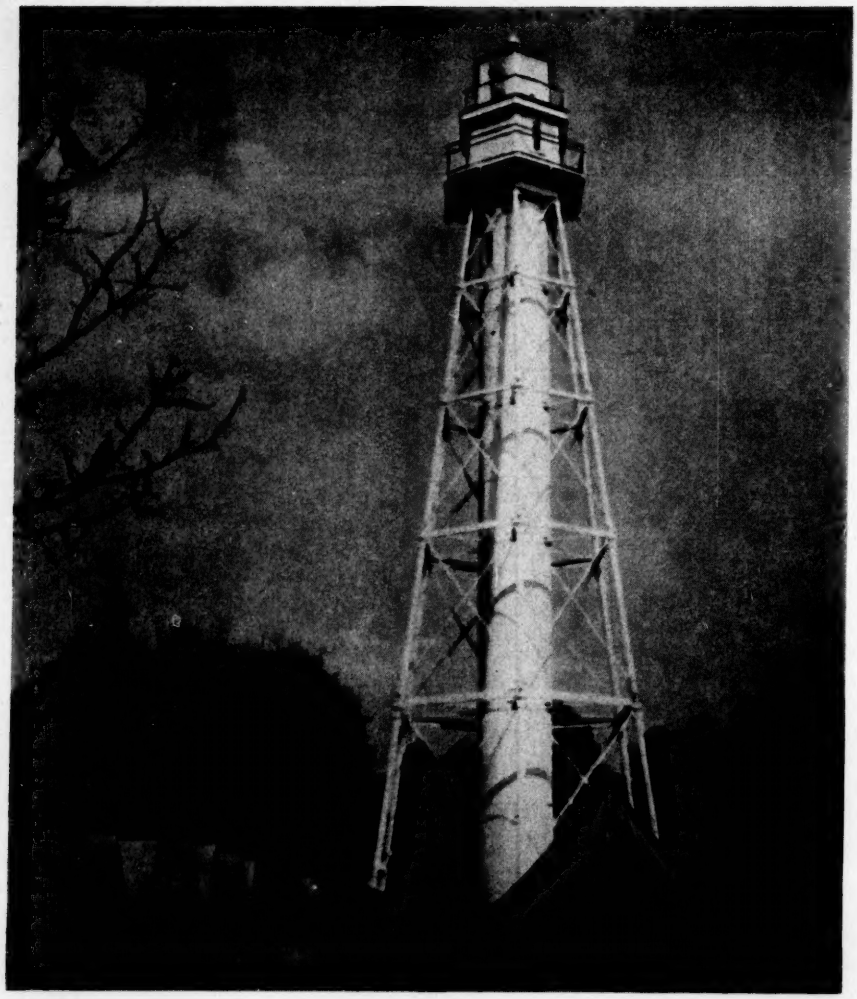
A Defense Battalion Trains at Camp McDougal

By 2nd Lt. Robert D. Heinl, Jr., U. S. M. C.

ON a remote island off the coast of South Carolina's "Low Countries" the Marine Corps' newest permanent camp and newest type of organization have arisen and taken shape side by side. Camp McDougal, Hilton Head Island, is the camp, and the Third Defense Battalion is the organization. Each has attracted Service attention in its own fashion: the first as any new station must; and the second as a military task—organization completely novel within the Corps.

Since the defense battalion remains a newcomer whose arrival was unheralded at the outset, perhaps it might be well to set forth the nature of such a force, its mission, organization, and probable employment. The name itself, "Defense Battalion," indicates its nature in a word, for the unit is designed to provide an all-around defense for a naval base or strategic location against attacks by air or sea—it might not be heresy to term it a Marine Corps version of Coast Artillery. Strange as this characterization may at first sound, it is quite within the bounds of stated mission of a Corps charged in Navy Regulations "to man such naval defenses . . . as may be erected for the defense of naval bases and naval stations beyond the continental limits of the United States." Simply, the defense battalion lifts from the highly mobile and essentially offensive units of the Fleet Marine Force Brigades the onus of providing relatively immobile base defenses. Their liberty of action and that of the United States Fleet is thus assured when sensitive advanced bases are securely held by units trained

Firing at Hilton Head



The Hilton Head Lighthouse

and equipped for just such a mission.

Like any task-force designed to ward off thrusts from the air and sea (and like its prototype, the Coast Artillery), the Defense Battalion embodies a group of varying weapons which range from antiaircraft guns, machine-guns and searchlights to seacoast-batteries equipped with Navy five-inch guns and machine-guns for beach-defense. More exactly, its organization is as follows: (1) an anti-aircraft artillery group of three four-gun batteries of mobile Army three-inch guns; (2) a searchlight and sound-locator battery; (3) a .50 calibre machine-gun battery; (4) a .30 calibre machine-gun battery; (5) a five-inch artillery group divided into three two-gun batteries of Navy five-inch fifty-one calibre guns. Because it is not required to move rapidly, the total personnel, officers and men, amounts to some 750, and required transport and headquarters services are at a minimum. Although its troops normally carry the pistol, their rifles accompany them to all stations so that as a last resort, they may provide their own ground-security as Marine infantry.

Although announced or speculative assignments to duty project defense battalions—in anticipation—to far-flung islands from the Caribbean to the mid-Pacific, the only island so far to be occupied is that of Hilton Head, a site sufficiently untamed, but not in apparent danger of seizure or in need of defense. The relative remoteness of Hilton Head is ideally suited for concentrated gunnery-training, and the South Carolina winter climate is sometimes compared even to that which Southern Californians boast. With Parris Island at least in supporting distance, the site approaches the ideal.

Camp McDougal is, in fact, senior to the Battalion which now occupies it, having been first employed by troops of the erstwhile Fifteenth Marines during their period of organization in the past two years. Federal occupancy of the land dates back much farther, since the Government reservation was originally that set aside for the Lighthouse Service, several of whose structures dominate the camp and provide facilities around which life revolves. To trace the matter even more remotely into history, we can look to Hilton Head's seizure in one of the U. S. Army's early landing-exercises, during the Civil (or as the Low Countries say) "the Confederate" War. Thereafter, planters, who had kept this Sea Island under complete and luxurious cultivation, were forced to flee, and their lands became forfeit in taxes, or reverted by Squatters' Rights to colonies of former slaves, many of whom but one generation removed from Africa, and who to this day speak an aboriginal patois known as "Gullah." Over the once cultivated island grew a semitropical forest of palmetto and pine, broken here and there by clearing tilled by Negroes. Along its isolated white beaches, the surf rolled alone except where a few navigational marks were sited by the Lighthouse Service. Inland, amid a clearing hung with Spanish Moss, a tall lighthouse overshadowed a cluster of buildings. Later, they were to become the Headquarters and Post Exchange, respectively, of a Marine Corps camp.

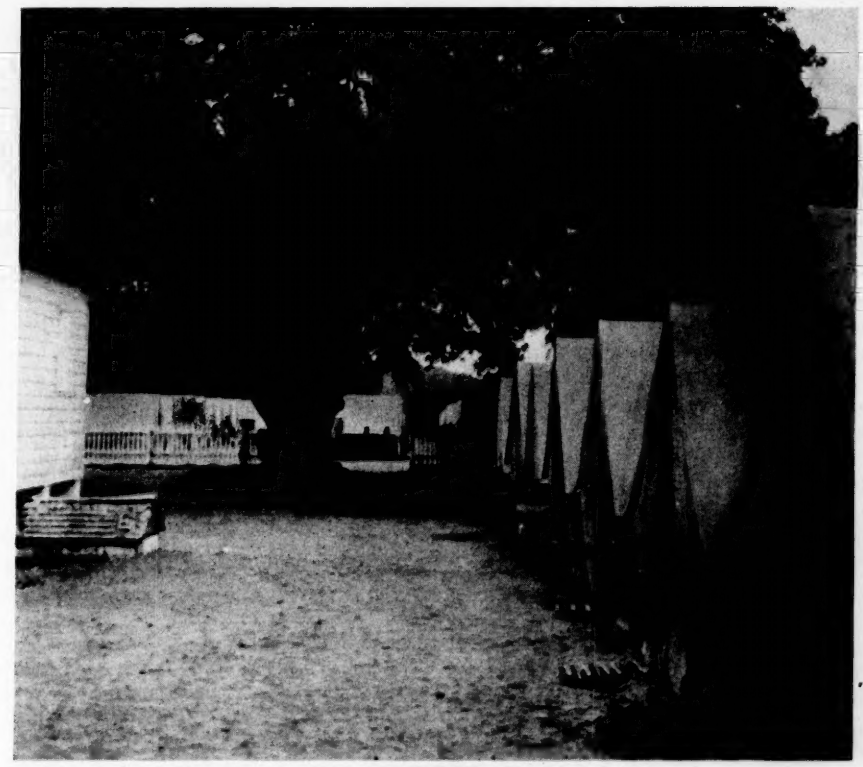
Here, in mid-Autumn, the Third Defense Battalion began its training-program for all weapons as they became available and as recruits joined to fill the expanded unit. A natural division of the reservation into beach and camp areas, with an intervening mile of swamp and woodland between, permitted training to be carried out uninterrupted on the beach while administration and normal services are provided in camp.

On the beach, cleared space extends for a complete anti-aircraft battery of three-inch guns and their fire-control gear, as well as a safety-tower recently painted Marine Corps green to the delight of at least one gunnery-sergeant who didn't feel quite at ease until all woodwork was just the regulation shade. To seaward of the four guns is a substantial seawall built by men of the .50 calibre machine-gun battery to protect their lengthy firing-line from tides which rise almost to the gun-positions. Just behind this wall is a level embankment of sand in which numerous machine-gun tripods have been emplaced so firmly that vibration, the bugbear of virtually all heavy automatic weapons, is substantially reduced. Somewhat to the right of the machine-guns, and down the beach beyond twisted ruins of a steel navigational-light, may be seen a complete meteorological station whose twirling vanes and arrows proclaim its readiness to provide artillery-data at any hour.

Like a true seacoast-gun, the single five-inch is emplaced in a pit which provides defilade. Located well north of the antiaircraft artillery, the five-inch has its own plotting-car and other necessary auxiliaries set to landward in the woods which in this vicinity border the beach. There also is the nerve-center: a large-sized plotting-board equipped with movable brass arms, slides and protractors, upon which the graphic reproduction of any target's movement is made possible, to the accompaniment of time-interval clocks whose insistent bells synchronize all operations.

Along the sandy road which joins the camp and beach, lies the magazine-area, a section of woods which has been cleared of all underbrush (but not entirely of rattlesnakes) and is now dotted with sandbag bastions to protect the various types of ammunition. Here a sentry is always posted as a firewatch. Special orders expressly forbid the use of his pistol on snakes!

The 3-inch AA Gun in Action



Camp McDougal

All day, truck-traffic shuttles to and from the beach, carrying working-parties, batteries to conduct training, and officers on duty. This road and its parallel telephone-line probably bear more traffic than any on the island, even that which covers the eight miles to the dock. Its route was completely overgrown when advanced detail surveyed and cleared it in work reminiscent of that in Nicaragua, so tropical is the Hilton Head forest.

Centered about headquarters in the light-keeper's one-time house, the camp proper extends in all directions. Within the yard and picket-fence (now carefully whitewashed by a Massachusetts maintenance-officer), all officers and staff noncommissioned officers have their tents. To the north is a large group of storage-tents used either as shops or to shelter property. Still beyond, in the edge of the woods, motor-trans-

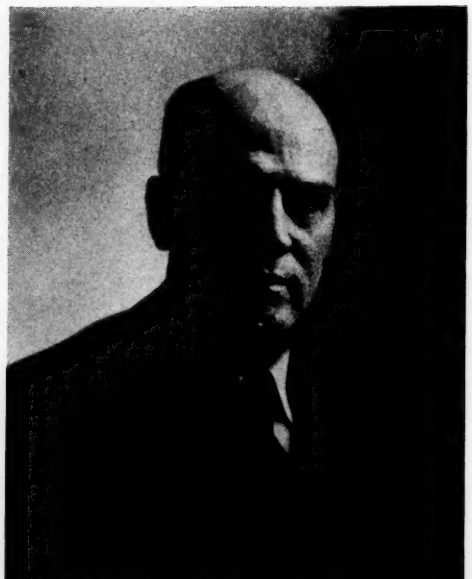
port parks its trucks and leads a secluded and shady life within easy distance of the heads, which are on the outermost frontier. Headquarters faces the main camp-area, mess-hall (in the process of extension to seat additional troops), and recreation-building which houses the Post Exchange. Timber encroaches closely upon the south side of Camp McDougal, but trees and Spanish Moss provide excellent shelter for the camp sick-bay, somewhat beyond which, during a week-end walk, the communication-officer noosed alive a huge cottonmouth-moccasin, aided only by a short walking-stick and a shoelace. Fortunately the camp itself seems to be safe from the incursions of such neighbors and much more allergic to mosquitoes, although careful medical testing has as yet failed to discover any of the malarial variety.

The day's operations and training will naturally vary, but certain features seem to be standard, such as tracking-drill for the antiaircraft guns, using planes sent from Parris Island. All morning and afternoon, the guns train and elevate in coincidence with the target overhead, while loading-crews simulate maintenance of fire with drill shells. Parris Island also provides a motor-boat for surface tracking-exercises by five-inch personnel. On many afternoons, machine-guns fire at towed aerial sleeves, very much to the fascination of the coastal gentry who maintain hunting lodges and preserves on the Island. By day the recreation-building becomes a school where director-crews and other technical personnel learn the mechanics of their instruments from charts that have in many cases been drawn on Hilton Head itself by officers who brought along necessary equipment for just such work.

At the same time that troops in Camp McDougal are being trained, elements of the battalion remain on Parris Island, where certain phases of instruction may be carried out equally well. In addition, since it is the head of transportation for the camp, Parris Island requires the presence of battalion quartermaster-activities. Daily boats which carry rations and mail to Hilton Head are the sole connecting-link with the main station, except radio. Once material is landed at the crude dock, trucks must ferry it over "the county road," a highway very similar to the motor-trails one used in Haiti. In forty-five minutes, a truck can reach camp after an eight-mile run through woodlands and cultivated stretches which are likewise suggestive of the fertile portions of Haiti. Along the road traffic consists mostly of negroes, although a single automobile may occasionally pass, usually bearing a license-plate at least three years old. In one respect, however, the county road would spell perfection to a highway-engineer: it has no billboards.

Camp-life has become settled now that all hands are well shaken down. During the day, drill keeps the command amply occupied, and the late afternoon is always available for athletics, hiking or fishing. By night, everyone burrows into his tent, lights the stove and lantern to spend an evening writing letters, reading or playing cribbage. And if civilian gentlemen happen to stroll into camp from the neighboring hunting-lodge, the Marines smile when they reflect that it costs the huntsmen hundreds of dollars to duplicate, even partially, the life in a defense battalion at Camp McDougal.

Mr. Charles Edison



Mr. Lewis Compton

The Marine Corps Gazette extends congratulations to our new Secretary of the Navy and Assistant Secretary of the Navy.

The Airship: Step-Child of Our National Defense

BY BROCKHOLST LIVINGSTON

THE American Navy is not in the habit of leaving jobs half finished. Recently we watched with rapt admiration as naval divers worked at great depths to salvage the sunken submarine *Squalus*. That vessel might have been left where it was—a permanent tomb to those who gave their lives in the development of the undersea boat—but that was not the Navy's way. The *Squalus* could be brought up and officers and men risked their lives that their dead comrades might find final resting place on the land they had served. For no greater reward than the "well done" which they so richly deserved they toiled for 115 days in the cold and darkness of the depths of the Atlantic. No vessel had ever before been raised from such a depth. *That* is the Navy's way.

Some years ago it was my privilege to observe at first-hand a small band of Navymen engaged in the operation of what was then our only existing rigid airship. I flew with them. I ate with them. I talked with them. Many of those men have since died in the development of the type of craft in which they had faith. Today, there is not a single rigid airship in our possession. Personnel is rapidly being dissipated and the progress we had made is being lost. Her flag hauled down, her gas bags deflated, the *Los Angeles,* still capable of flight, for seven years rested in her hangar at Lakehurst, a silent monument to years of pioneering effort, to lives lost in the abortive development of the rigid airship as an instrument of defense and commercial transportation. Now, she too has been dismantled but even this process served the purpose of permitting studies of her construction which had hitherto been impossible.

While my earlier experience with rigid airships had made me a confirmed advocate of this type of craft, I was able, a few years after, to observe a privately owned non-rigid, more commonly known as "blimp," ride out a storm over Washington which had grounded the combined airplane squadrons of the fleet. The wind rose without warning from seven to thirty-five miles an hour. The little blimp took to the air, headed into the wind and, for four hours, fought the gale which at times reached a velocity of fifty-five miles per hour. When the storm had subsided the ship was flown to Langley Field, 150 miles away, to be landed for the night. The antics of that tiny craft which had ridden out a gale that forced airplanes to scurry for cover turned my thoughts to other forms of lighter-than-air activity. The airplane had received its full measure of publicity; the airship was able to obtain only spasmodic and insufficient support from the country. Only a fraction of what we have spent on heavier-than-air craft has been devoted to the airship branch of aeronautics. What was the reason for this inertia on our part?

There is no intention to place on anyone's shoulders the responsibility for our failure to develop airships. There is, however, a determined desire to point out the fallacy of our past neglect and to impress the loss which is ours. As an indication of the state of the airship art in this country I was amazed recently to learn that only one copy of a valuable little pamphlet on the operations of nonrigid airships was known to be in existence. This booklet was written when the experience of the First World War was fresh in our minds. How soon we forget! But let the neglect of the past lie hidden; let the future be bright with the progress which the history of the airship warrants. It may not be too late to capture what we have neglected in the past.

The present war had not been long in progress until England was faced with the loss, first, of one of her aircraft carriers and, shortly after, with the sinking of the battleship *Royal Oak*. These losses have not altered the opinion that both these types of ships are necessary to the well-rounded fleet. Neither should our losses in airships cause us to abandon the type. In the United States alone some 25,000 airplanes have been destroyed with a loss of life of about 8,000 people. Three rigid airships have been lost with a cost in lives of less than one hundred. The development of the submarine has taken its toll in ships and lives. Many millions of dollars have been spent and continue to be expended in an endeavor to make such craft as safe as is humanly possible. On the other hand, the total expenditures throughout the world on airship development have been only a very small percentage of the expenditures for airplanes and submarines. Is it fair to judge the potentialities of a type after such meager support has been given it?

Responsibility for our neglect is of less importance than the rebirth of sound interest in the development of a type of craft which has proved its capabilities in both the stress of war and the quiet of peace. This is no place for masses of statistics; it is the place for a plea for fair treatment to those who still remain from that valiant band of men who have devoted their lives and, in some instances, sacrificed their naval careers, to a faith in lighter-than-air development in this country. Congress has been receptive to requests for funds to foster the airship's progress but there has been a lack of understanding of its place in commerce and defense, on the one hand, and a fear, on the other, that the airplane and airship are competitive. There is no competition between the two; each branch can reenforce the other. The will to permit them to do so is what has retarded progress.

Back in 1852 a Frenchman called Gifford built the first successful power-driven airship. It was a crude contraption even as far later examples were. In 1906 blimps were things of bamboo and string and ill-shapen gas bags. The science of aerodynamics was in its infancy. Count Zeppelin built the first successful rigid airship. Those who came to scoff at his attempts remained to praise and dirigi-

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ble development in Germany became an accepted fact. In 1929 the *Graf Zeppelin,* named in his honor, circled the world on a trip of more than 20,000 miles. Even Zeppelin himself may not have foreseen the advances which limited support had made possible. What further progress might have taken place had greater support been forthcoming one cannot say. We do know that the Zeppelin type of rigid airship proved its worth in both peace and war; that scheduled passenger voyages were maintained and only lack of a non-inflammable lifting gas spelled the end of German operations of this nature. We know also that completely metal-clad airships are an accomplished fact and that our own Navy has been operating one for more than ten years. Limited in means as their proponents have been, airships have progressed and the blimp or rigid airship of today no more resembles the airship of a quarter of a century ago than the automobile of today resembles the horseless buggy of its day.

Advocates of the airship do not claim unlimited possibilities for their brain-children. They foresee no armored battleships of the air capable of displacing every existing type of surface and sub-surface vessel. They recognize certain inherent limitations similar to those found in the submarine, in every type of surface vessel and, yes, in every type of airplane. Consequently, study has determined that the airship has two principal fields of future progress, namely, naval and commercial. Even airship enthusiasts believe that the engagement of airships on land battle fronts, no matter how good their protection, is nonsense in the future. The mission they might carry out may be as well if not better performed by planes. That does not, however, detract from their known capabilities.

In view of the prevailing unsettled world conditions the present may not be the opportune time for inaugurating overseas airship services. However, if the Navy which has heretofore carried on our limited development of lighter-than-air craft is permitted to continue and expand such development, the progress which is made will be available to commercial airships when there is a return to peace. It is probably not known by many that there exists in this country a well-established commercial airship service comprising a number of small blimps. Without subsidy of any form the company owning these craft has operated its fleet for the past twelve years and during that time has carried over two hundred thousand passengers without a single passenger injury. Every condition of weather has been met and mastered; every form of operating condition has likewise been faced with success. Ships have been maintained at mooring masts for long periods and placed in hangars only when major overhaul was required. The record of this privately owned blimp fleet is ample evidence of the practicability of lighter-than-air craft and still we have devoted so little in effort and money toward the proper development of this branch of aeronautical science.

Because airships for strictly military (army) purposes are impracticable and their commercial development may better be delayed until the return of peace and we have had more experience with naval types, the balance of this article will be devoted to the naval uses of both rigid and non-rigid airships. There is sufficient evidence available to indicate that there are very definite qualities inherent in the airship which prompt its use as an adjunct of the surface, sub-surface, and heavier-than-air arms of the Navy. During the last war the German navy employed a total of eighty airships but never more than nineteen at any one time. While plenty of success was attained with these craft full advantage could not be taken of the airship's capabilities due to a lack of well-formed plans for their employment, inferior military equipment, and poor base technique. Designers were not sufficiently well versed to undertake the rapid construction which war necessitates if losses are to be replenished. Each of these lessons applies to the present state of the airship art in the United States. Even with the handicaps which faced the German Zeppelin crews much was accomplished. The presence of airships at Jutland is unquestionably responsible for the escape of the German High Seas Fleet. The effort expended on their entire airship program was repaid by that one achievement. But the airship accomplished other things as well. Zeppelins saved the German cruisers which raided Yarmouth and were instrumental in sinking the *Nottingham* and *Falmouth.* The official British report of the Battle of Jutland records the belief that airships on the British side might have had far-reaching effect in hastening the end of the war.

At the Battle of Jutland the British employed one seaplane carrier, the *Engadine,* fore-runner of our present aircraft carriers. The one plane which it sent up accomplished nothing. We have conclusive evidence, however, that the German Zeppelins *did* accomplish a great deal. What has been the aftermath of those two attempts to use aviation in a modern sea battle? The aircraft carrier has been favored with continuous development while the airship has been neglected. The *Engadine* was a tiny cross-channel ship converted into a seaplane carrier. From it have sprung the gigantic *Lexington* and *Saratoga.* What might be our knowledge of airships if the same amount of effort and money had been devoted to their development as we have expended on surface aircraft carriers?

It is entirely feasible to utilize airships as airplane carriers. We did so with our *Akron* and *Macon.* Even the most enthusiastic airship advocates do not contend that airplane-carrying airships could be substituted for all surface aircraft carriers but they do have faith in the fact that there is a place for exceedingly fast transports of airplanes for use as an independent striking force. With the loss of the *Courageous* the British fleet lost one-seventh of its completed carrier strength. At least five airship airplane carriers may be built for the cost of one surface carrier of our *Yorktown* class and the bombing plane carrying performance of each airship would be equivalent to one-third that of the five times more costly surface carrier. The loss of the *Courageous* proved the vulnerability of that type which must face attack from gunfire, mines, torpedoes, and bombs. The airship carrier, on the other hand, may only be attacked by gunfire and bombs and possesses certain inherent protective qualities to defend it from even these forms of offense. Every type of naval vessel must take risks and none is immune from the threat of destruction. If a nation can provide a type which gives the same performance in offensive qualities and is more easily defended by virtue of its higher speed and ability to *avoid* attack, that nation has an ace in the hole, particularly when such a type permits the distribution of offensive power as,

for instance, five airship carriers vs. one surface carrier. The United States, generously endowed with an almost unlimited supply of helium, holds the ace I have mentioned —but we have certainly been bluffed by the other players.

It is questionable whether the European nations have a place in their navies for rigid airships. With relatively short flights necessary to reach any bombing objective, planes may as well be based on land. However, this is not our position. To reach an enemy we have to go after him and we have thousands of miles of water between us. Ours is a high seas fleet and we must be prepared to exert our striking force at a great distance from our shores. The rigid airship definitely has a place in our naval organization and European nations in the last war discovered that the smaller, nonrigid, airships had a place in theirs. Germany used rigids as scouts and, to a more limited extent, as bombers, although the latter duty was secondary to the principal mission of scouting. England, France, and the United States all employed blimps for observation and patrol. We maintained a number of blimp stations in both France and England. It is an accepted fact that out of the hundreds of convoys escorted by lighter-than-air craft in the last war only two ships were sunk. During the seventeen months prior to the Armistice, British airships sighted forty-nine submarines and successfully attacked twenty-seven of them, according to reliable information. The fact that Great Britain does not now have any blimps for convoy protection is not due to diminishing faith in such craft but because the vulnerability of *hydrogen*-filled airships has reduced their usefulness. Had helium blimps been available immediately upon the outbreak of the present war, losses from submarines might well have been materially reduced. We have the helium and still fail to take advantage of the record of far less efficient First World War nonrigids. Our neglect may be costly in the future.

Airship development has not stood still since the last war. There have been many advances made in design, in ground handling, in power plants, etc. Some theoretical improvements have not been put into practice because of the lack of ships on which to test them. There has been a certain amount of negative information culled from the disasters which have occurred. We have found how *not* to do things. Development is going ahead as rapidly as absurdly limited funds will permit. But, unless we provide the tools with which to work the ever-diminishing personnel assigned to lighter-than-air work will soon be entirely dissipated and the airship will be back where it was before the last war during which we had to import foreign instructors to train our officers and men. We might not be fortunate enough in the future to find such instructors available abroad.

Contrary to general belief, the technical opinion of this country is in favor of continued research and development of the airship as an instrument of national defense and commerce. There is no record of an adverse recommendation *by a responsible group*. Anyone who has taken the trouble to look into airships has not failed to be favorably impressed in some manner. On the other hand, there is a very definite opposition against airships and there is an appalling ignorance among the general public as to what an airship is and what it can, and cannot, do. Editorial opinion throughout the country both before and since the *Hindenburg* disaster has been overwhelmingly favorable to the airship. From the time of the loss of the *Akron,* continuing through the reaction following the disaster to the *Macon,* and up to the present, responsible bodies have recommended that naval airship development be carried on. Superficial and prejudiced criticism has been the greatest obstacle which the airship has had to face. The average person has been too ready to accept criticism as gospel while the facts in the case have influenced only the responsible minority. It must be impressed that the airship and the airplane are not competitive but complementary. Each has its own field of operations; each its own mission to perform. In suggesting that airships be fostered does not imply that any less effort be made in the building up of our airplane strength. Lighter-than-air is merely one of two major branches of aeronautics.

Vulnerability is claimed to be one of the greatest weaknesses of the airship. Every naval vessel is vulnerable to certain forms of attack. The secret lies in the employment of each type in such a manner that the opportunities for attack are lessened. So it is with the airship. Advocates of this type are frank in their admission of its limitations. They do not propose that airships be sent along with a fleet and hover over the battle line where they would not only divulge the position of surface ships but leave themselves open to attack from enemy anti-aircraft guns and fighting planes. Surface aircraft carriers are not expected to meet heavier enemy ships and, likewise, aerial aircraft carriers would be expected to make use of evasion as their principal form of defense. Only by accident would an airship place itself in a position of vulnerability. In the 1914-18 war Zeppelins often avoided airplane attack by being able to climb more quickly and reach a greater height. While the performance of planes has improved greatly since the last war, it is calculated that it takes 9½ minutes for a plane to reach 15,000 feet. The *Macon* was able to rise *20,000* feet in *five* minutes. It would be very difficult, therefore, for a plane to get above an airship (as was done on occasion in the last war) and attack from that position is, consequently, unlikely. Besides this, the airship has its own guns for defense against attacking planes and is a decidedly better gun platform than a fast moving plane.

One of the most effective means of evasion which the airship possesses is the ability to lose itself in a cloud bank. Even while it is thus invisible from the surface it can maintain contact with operations below by means of its sub-cloud, or spy, car. Negative information is often as valuable as positive in the operations of a fleet. A clear ocean space permits unrestricted movement and the existence of such can be determined by the airship operating unseen and at low speed. The airplane cannot perform these functions for it relies on speed to maintain flight.

It is easily understandable that a fleet commander's first reaction to the suggestion that airships be added to his command would be that they merely add to his difficulties. He has already some thirty types of surface and sub-surface craft as well as a number of airplane types to direct. Each, however, has a distinct function to perform. This is equally true of the airship. It does not displace any existing type but does materially supplement the operations of

every other vessel of a fleet. Let us examine briefly what functions the naval airship, both rigid and nonrigid, may perform.

The difference between rigid and nonrigid airships must be borne in mind for the one cannot take the place of the other except in rare instances. The blimp, or nonrigid, is an inexpensive craft which can be turned out in quantity in relatively short time providing we have at least the nucleus of an airship industry in the country. It is less expensive than the large flying boat upon which we now rely for many duties which, if available, would be performed by blimps. Among the many tasks which would be allotted to blimps if they were available in sufficient numbers are: Anti-submarine work, harbor and coastal patrol, protecting fleet sorties and entries from and to harbors, locating mines, convoying merchantmen, serving as aerial listening post off shore, and carrying infra-red, optical range locating apparatus. These may be classified as war-time or neutrality patrol functions. The nonrigid may also be used for photographing the fall of shot in target practice, for chasing torpedoes, and for miscellaneous chores, rescue work, etc. Many of these tasks, such as aerial listening post, and the carriage of infra-red, optical range locating apparatus cannot be performed by planes as they are unable to hover; forward flight must be maintained. Besides, certain of the equipment is too bulky for the ordinary plane.

The rigid airship is decidedly more of a *fleet* type and would have its allotted place in the fleet organization. The blimp is more adaptable to operating from shore bases although its possibilities as an adjunct of the fleet have not yet been fully explored. The rigid airship is a craft capable of long flights (6,000-10,000 miles) as compared with the blimp's shorter endurance of probably 2,000 miles at cruising speed. The rigid is intended to secure information either through its own endeavors or the operations of the planes which it carries to within short range of the area to be observed. Its most promising field lies in the carrying of combat airplanes to within striking distance of their objective. Designs are available of airship-airplane carriers capable of extended flight at comparatively high speed while carrying eight to ten planes.

The tasks which airships can perform are not just dreams of the proponents of such craft; every one has been tried out and found practical, some in the face of hostile operations. The inability of the airplane to perform the same tasks as well or at all is equally well known. Should we longer pursue the shortsighted policy we have followed with regard to airship development?

There have been disasters to airships but many of us forget that there have also been airplane losses and submarine losses and train wrecks and passenger ships sunk. It is probably not generally known that on the Mississippi River alone more lives have been lost in boiler explosions on steamships than the world has sustained in all its airship disasters. But, as someone said, it is from the scrap heaps of failures that lessons are learned and, when applied, result in real progress. Deplorable as our loss of life has been, perhaps our scrap heap of airship failures has not been sufficiently large to prove the capabilities of the type.

It must be remembered that we started from scratch in our dirigible development. In 1917 when the order came for the first blimp to be built for the Navy we had no airship pilots. When it was completed the men who flew it from Chicago to Akron had never seen an airship before but had built this one from Navy blueprints, climbed aboard and, on their first flight, broke the record for distance flown by a small airship. That is what American initiative has done in the past and what it can do in the future if our airship men are only given the chance.

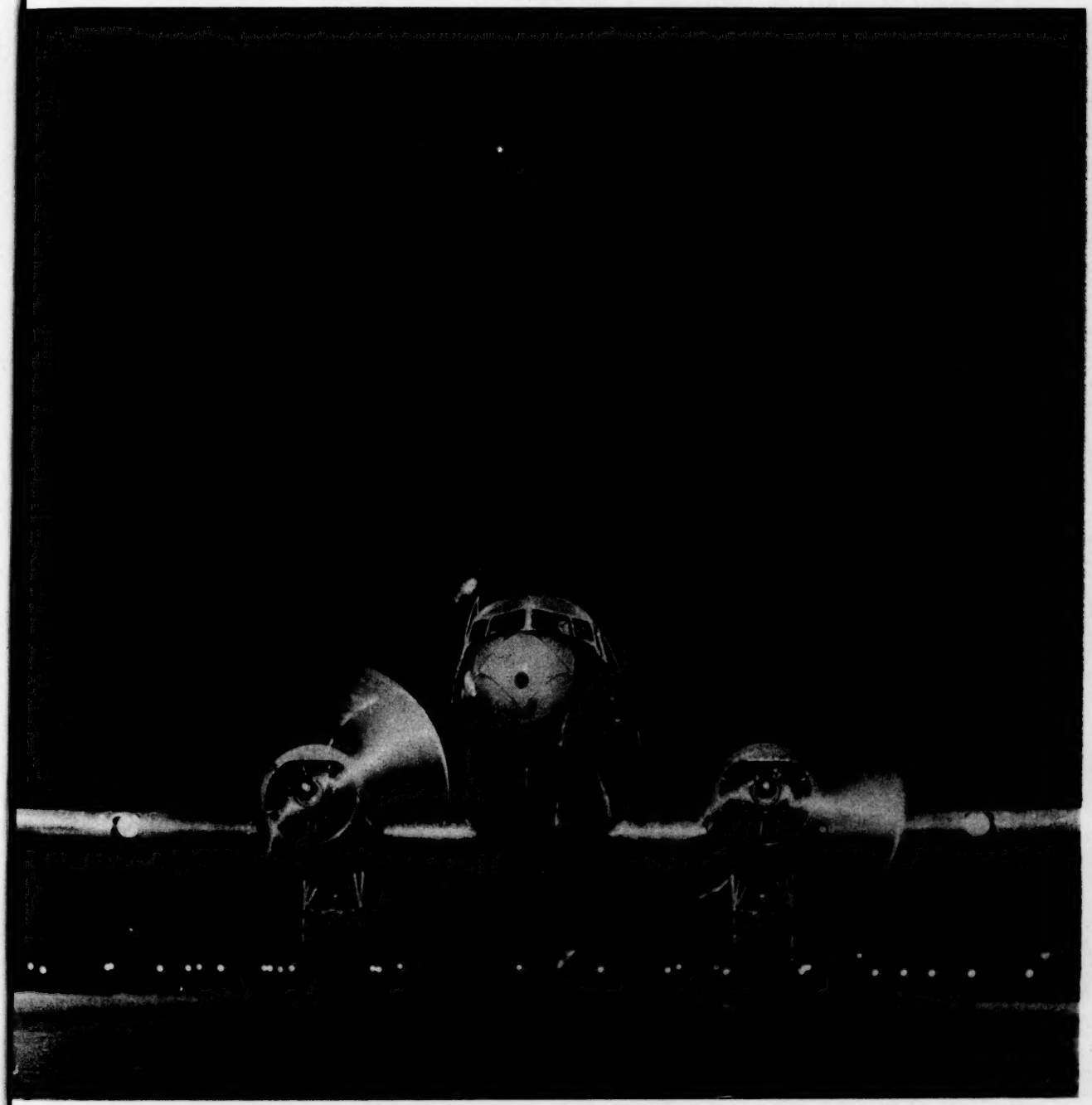
We have practically no lighter-than-air reserve personnel in the United States and regular officers and men who have been connected with this branch of aeronautics are rapidly being absorbed by regular naval duties. There is a "feel" to airship handling which can readily be lost unless one is kept in touch with the science. Conditions in the airship industry are equally poor. Our building facilities are far too limited to undertake any rapid expansion and those who know realize there will be a demand for blimps and the larger ships if the war clouds spread our way. Our helium resources which are the envy of the world are lying idle when they might be providing us with a means of defense no other nation can have.

A comprehensive national airship policy which we have formerly lacked is a necessity now before our progress is lost in the fog of the past. While airplanes are being built in quantities we never even contemplated before, not one cent of rearmament funds is available for expansion of our airship strength. In the face of repeated and authoritative recommendations that we continue to build rigid and nonrigid aircraft, these types are completely neglected. No one expects the millions of dollars which are being devoted to airplane construction to be available for airship building but something must be done if we are even to retain what we have built up with the meager assistance granted in the past. Today, although blimps are an ideal and economical type of craft for neutrality patrol, there is but one ship of this category suitable for such work available to the Navy. In fifteen years we have built *one* Navy designed blimp.

On the statute books there is authority for undertaking the construction of a small rigid airship. Congress passed the measure in May, 1938. As yet, no funds have been made available. Dilly-dallying tactics and trying to get one million cubic feet to do the work of three million are responsible for our delay. Congress is inclined to aid the dirigible but the responsibility lies elsewhere.

A starvation diet for anything soon destroys it. Airships have been existing on starvation diets for too many years and it has only been the complete faith of their advocates which has kept them going. Eight blimps operate spasmodically from their base at Lakehurst. Only one is of modern design. The others are make-shifts and unsuited to anything but training of personnel. The fleet has no knowledge of how to absorb airships into its organization and does not seem to care. Engrossed with the potentialities of the flying boats and the spectacular surface aircraft carriers, most officers seem content. The public cannot be expected to inquire very deeply into what goes on. They hear of majestic mass flights of super-flying boats but seldom of the groundings and other defeats encountered. The airship comes to their attention only when some blimp of early vintage wrecks itself from sheer exhaustion at the struggle to keep going, or there is a dis-

aster such as the *Hindenburg*. The days and years of quiet training, of endless research, of obstacles overcome, never reach the notice of the public. The airplane has arrived at its present state through spectacular but not always constructive undertakings; the airship is in its present sick condition as a result of perhaps equally spectacular but always more constructive disasters. Airships never had a barn-storming era; the airplane did. Both may well be considered beyond that stage now and developed calmly and thoroughly. The two are but branches of the same science and, consequently, deserve equal treatment. The airship has not got it heretofore and it is high time it ceased to be the step-child of the aerial family—to say nothing of our national defense.



Wings Into the Night

Marine Corps Advance Flight School

By Major L. N. Medaris, U.S.M.C.

Prior to the spring of 1925, very few Marine Corps pilots had received advance flight training in Service Schools. Major Brainard, then OIC Marine Corps Aviation, inaugurated the policy of giving advance flight training to all pilots in the aeronautical organization of the Marine Corps and sent six pilots to Kelly Field, Texas to attend the Advance Flying School of the Army Air Corps. Three pilots were assigned to take the observation course, two the course in pursuit and one in the newly organized course in attack aviation. These courses were so designed that a pilot became familiar with each type of mission in his course and after finishing the school could take his place in that type of operating squadron and successfully accomplish any mission assigned. A few more classes were sent to Kelly Field, then for reasons beyond the control of the Marine Corps they were discontinued.

Early in 1926 an observer's school was established at Brown Field, Quantico, Virginia, for the training of pilots as observers. While it lasted this school did wonderful work, but for the lack of pilots, funds and airplanes, the school was closed. Since that time marine pilots have not attended advance flying schools.

At about this same time older experienced pilots were sent to The Air Corps Tactical School and there have been one or two pilots attending this school each year until this present term. This school will not be available for an indefinite period owing to the expansion of the Army Air Corps. Pilots not fortunate enough to attend these schools have received their advance training in the operating squadrons. Now that the regular pilots have been augmented by reserves and cadets who are on active duty for a limited number of years, these squadrons are overtaxed with advanced training schedules. The tactical efficiency of the squadrons has been reduced. The annual turnover of officer personnel makes it necessary for the squadrons to spend most of their training periods on teaching the pilots how to accomplish missions instead of profecting their tactical training. For example: The training of new pilots for instrument flying in Quantico during the past year occupied so many of the available hours for the Link Trainer that there was not enough time left for the experienced pilots to receive their required refresher course.

Scouting squadrons take the burden of training because their pilots must act as aerial observers and if the pilots are not qualified as aerial observers when they join the squadron they must receive this training in addition to the advanced flight training. Because of the lack of trained observers among the officers, sometimes enlisted men are pressed into service as observers. This happens only where the mission is such that the specialized training of the enlisted man can be utilized; such as routine photographic missions or laying a smoke screen where the men can release the smoke on signal from the pilot or flight leader. Other missions are of such a nature that it is imperative that a trained officer be used as an observer. When a scouting squadron is operating as an observation squadron most of the missions consist of flights with only one or sometimes two planes. This requires exceptional training for the pilot as well as for the pilot observer in as much as they do not have an old experienced division or squadron leader along to get them out of difficult situations. For the above reasons the scouting squadron will be used as an example to show the need for a school to give advance flight training to new pilots.

In the Marine Corps the scouting squadron must perform the missions which are assigned to four different types of squadrons in other branches of the service. It must act as a Navy Scouting Squadron, Army Attack Squadron, Army Observation Squadron and Navy Observation Squadron. As a Navy Scouting Squadron it must operate with the Fleet by operations from a carrier or land base, scouting and patroling over the open ocean. This requires navigation ability of the highest quality. As an Army Attack Squadron it must operate with the Fleet Marine Force. This requires being trained the same as the Army Air Corps Attack Squadron in straffing and bombing ground troops, in the use of smoke and aerial chemical warfare. As an Army Observation Squadron it must also operate with the Fleet Marine Force. This requires the same training as is received in the Army Observation squadron, but in addition the marine pilots must be trained as observers to accomplish command missions, infantry missions, artillery missions, and tactical and strategical reconnaissance missions. As a Navy Observation Squadron it must be trained to work with the Fleet in spotting ship's gun fire.

Since the aerial observer is the eyes of the commander this one phase of training and its requirements will be discussed a little more in detail. The Air Corps Tactical School describes an aerial observer as follows: "He should be a trained aerial gunner, a radio operator and a aerial photographer; he should also have an excellent working knowledge of ground troops and their operations, and should be able to fly the plane home in case the pilot is disabled or killed." Each one of these requirements will be broken down to give a better idea of the magnitude of the knowledge and ability required of an observer.

A trained aerial gunner: The observer's armament is the old familiar 30 caliber Browning machine gun. The technique of fire is radically different from that of any ground machine gun. The gun is mounted on a flexible mount, which is in turn mounted on a rapidly moving plat-

form which is capable of being maneuvered violently in three dimensions. With this weapon the gunner must learn to hit fleeting targets that may be traveling as fast as 400 miles per hour, and moving in any direction. It is necessary that he must consider his own speed as well as that of his target; that he must handle his gun in a slip-stream which is the equivalent of a full grown hurricane. The present sights are poor and he must be trained in their use. His only other concern with armament is the knowledge that the pilot has a fixed machine gun which he will probably never be able to use against an attacking fighter.

A radio operator: He must be able to transmit and receive so well that it becomes automatic and requires no mental effort. He is required to keep a radio log, and it will often be necessary for him to send or receive messages first and record them later. This is particularly applicable to fire control missions where the message is almost always sent first and recorded later. In addition to communicating with his radio he must be able to keep it in operation while in the air. He must be able to tune his transmitter and adjust his frequency as required and understand the shifting of coils in the receiver. After he has mastered the mechanics of radio operation he must master the proper procedure. This includes an intimate acquaintance with the following: Naval Communication Instructions, Joint Army Navy Procedure, The Navy Call Book, Current Fleet Communication Letters, code and signal books, radio operator's signal books and the like. He also operates the radio direction finder. Thus we see that the term "radio operator" means more than the ability to send and receive messages in code.

An aerial photographer: He must have a knowledge of the general theory of photography; know the general characteristics of standard equipment, including the particular functions and the technique of operation of each type of standard camera. He must be able to take and lay out an uncontrolled mosaic, and have sufficient knowledge of photographic interpretation to realize the best position from which to take obliques and pin points to show the features most desired.

A working knowledge of ground troops and their operations: This does not imply a book or parade ground familiarity, but rather, a familiarity with the size and appearance of all ground units under all conceivable field conditions. He should know how much space they will occupy in different situations, where to look for their various installations and understand the performance of different vehicles and tanks, and be familiar with the appearance and capabilities of infantry, chemical weapons and artillery. He should recognize different classes of artillery both on the road and in firing position. For work with artillery he must understand artillery firing technique and be able to recognize appropriate artillery targets. This familiarity with ground troops must be applied to the enemy as well as to our own. He must be able to recognize and identify things from directly overhead by shadows, their characteristic trace on the ground, the activity around them or by the shape and appearance of their plane view. He must learn to make a reasonably accurate appreciation of the terrain below him from a military standpoint. He must understand the changes in the appearance of things from different altitudes and know what to expect to see from different altitudes. His experience should extend over all seasons of the year so that he will appreciate the changes in the appearance of things at different times of the year. He must make accurate estimates of distances and keep oriented under all the conditions mentioned above.

He should be able to fly the plane home: This will be apparent when we consider that the observer may have valuable film or information that will be lost if the plane crashes. As we are speaking of training pilots to be observers no more need be said.

He must also be able to keep up situation and intelligence maps; make out observer and intelligence reports, learn order forms, read tactical maps, learn and use military symbols and understand "canned language."

Considering the fact that the marine scouting squadron must at all times be qualified to take over any or all the functions of the four specialized squadrons previously mentioned you will understand it is necessary to have all of its pilots well trained in every type of mission. There is not sufficient time to accomplish all this training within the squadron. There are many other activities such as training mechanics, radiomen, ordnance men and other technicians and the upkeep of planes and material which must receive attention. Time must be found to carry out the basic training of enlisted men as prescribed in Marine Corps Order 146. There are not enough hours in the day nor enough days in the year to make out a training schedule to cover all of these requirements and at the same time participate in Fleet Problems, Fleet Marine Force Maneuvers, Marine Corps School Demonstrations, parades and ceremonies, guard duty and leave. Sending a pilot to a scouting squadron before he has attended an advance flight school is like sending a recruit to sea duty before he has attended a sea school. The organization and the individual both suffer.

The following list covers the subjects in which a pilot reporting for duty with a scouting squadron should have had previous thorough training:

*Carrier landings, preliminary work.
*Navigation.
*Link Trainer.
*Instrument flying.
*Night flying.
*Airways beacon flying.
*Radio operator, as described for the observer.
*Methods of laying smoke, destructive agents and aerial chemical warfare.
Scouting.
Aerial gunnery, free gun.
*Acquaintance with combat orders.
*Map and chart reading.
**Military intelligence.
**Command missions.
**Infantry missions.
**Artillery missions.
**Tactical reconnaissance.
**Strategical reconnaissance.
**Aerial photography.
**Spotting ship's gun fire.

Of the above list those subjects marked with an asterick are common to the bombing, fighting and utility squadrons. Those marked with a double asterisk are necessary for

(*Continued on page* 48)

The Admiral Graf Spee

COMMANDER EDWARD ELLSBERG, U.S.N.R.

(Courtesy of the Sperryscope)

One of the most interesting battles in naval history was fought last month off Montevideo.

THE MARINE CORPS GAZETTE *presents herewith a specially prepared article on the engagement by an acknowledged naval authority, Commander Edward Ellsberg, U. S. N. R. Besides telling the story of the* Graf Spee, *Commander Ellsberg takes the reader back to November, 1914, when Vice Admiral Graf von Spee, for whom the* Graf Spee *was named, engaged Vice Admiral Sir Doveton Sturdee in the historic battle of the Falkland Islands.*

Commander Ellsberg is well known as the author of "Hell on Ice," "Men Under the Sea," "On the Bottom" and other books. He graduated from the Naval Academy in 1914 and as a young ensign was assigned to duty as Assistant Navigator and Gyro-Officer on the USS Texas. During the World War, he served as a Lieutenant and was assigned to the fitting out and operation of Mine Sweepers. He was Salvage Officer of the S-51 *and in 1927 was Salvage Officer during the initial stages of raising the* S-4.

Commander Ellsberg holds the Navy's Distinguished Service Medal. He resigned his commission in 1926 and at the present time is a Commander in the Naval Reserve.

PROTRUDING from the mud at the mouth of the River Plate, shell-torn and water-logged, rests the wreck of the *Admiral Graf Spee,* ingloriously scuttled on orders from the German Admiralty — for years to come there to remain a battle monument vividly recalling to every ship peacefully passing in or out of the Plate the epic fight in which she met defeat, while a few miles away, beneath the Argentine sod, rests Captain Hans Langsdorff, her commander, like his proud battleship, in a strange gesture of despair, self-destroyed.

There in the mud lies the *Graf Spee,* her flame twisted superstructure gaunt against the eastern horizon, a paradox when she was built, even more a paradox in her unbelievable end—that pocket battleship designed by Germany to outshoot anything she could not outrun, to outrun anything she could not outshoot.

But when the day of battle finally came for her, she could do neither. Under the light guns of three faster but weaker British cruisers whose officers refused to realize that they were supposed to run before the *Graf Spee's* superior gunpower, lest they be swiftly annihilated, and hung on to fight instead, she herself chose to flee into a neutral port for safety, a sadly crippled ship whose fighting days were over.

How did Commodore Harwood with his three lightly protected cruisers, throwing together a broadside of but 3,136 pounds of 6 inch and 8 inch shells, perform that miracle against the more heavily armored main battery of 4,831 pounds from the *Graf Spee's* 5.9 inch and 11 inch guns? The facts are not all in yet, but it seems to have been done by Harwood's three cruisers casting conventional tactics to the winds and fighting perhaps the most unorthodox battle in British naval annals.

Outranged by the *Graf Spee's* six 11 inch guns which could land effectively at the enormous range of 30,000 yards, where even the 8 inch guns of the *Exeter* were useless, with the thin armor of his three cruisers no better than tissue paper as protection at any range against the *Graf Spee's* 670 pound shells while that pocket battleship's more heavily armored belt and turrets except at close range would certainly deflect the British 100 pound and 256 pound projectiles, Commodore Harwood faced a seemingly hopeless problem—as hopeless as Cradock's at Coronel a quarter of a century ago, where before the heavier guns, thicker armor, higher speed and greater number of the cruisers of that valiant Vice Admiral Graf von Spee, for whom this pocket battleship was named, Cradock's cruisers fighting in conventional line ahead formation were sunk without inflicting the slightest damage on his German adversary.

But perhaps after all Cradock had not died in vain. Facing again the heavier guns and the heavier armor of the *Admiral Graf Spee* (but this time the ship, not the man) a weaker British squadron, taught by experience, fought it out on totally different lines.

The *Ajax,* first on the scene in answer to an SOS in the early dawn of December 13, 1939, found the *Graf Spee* endeavoring to overhaul the French freighter *Formose* off Rio Grande do Sul. Fearlessly, the *Ajax* raced on to lay down a smoke screen to protect the freighter, and while radioing to her invisible consorts, she herself maneuvered to cut the *Graf Spee* off from the open sea, an effort in which shortly she was aided by her sister, the *Achilles,* steaming up to close off the seaward side, while the heavier *Exeter,* coming over the horizon from the north, threw herself across the path of the *Graf Spee* in that direction.

Apparently dismissing the two light cruisers and their 6 inch guns as beneath contempt, to be taken care of later at his leisure, Langsdorff of the *Graf Spee* opened up at maximum range on the *Exeter* astern of him, swerving to concentrate on her with both his 11 inch turrets. To get within range where her own guns might reach, the *Exeter* passed through a veritable hell of bursting 11 inch shells, of which one in the *Graf Spee's* seventh salvo tore the *Exeter's* fore turret to pieces and wrecked the bridge.

But still closing, the *Exeter* came courageously on, firing rapidly, steering now by hand from aft, keeping the *Graf*

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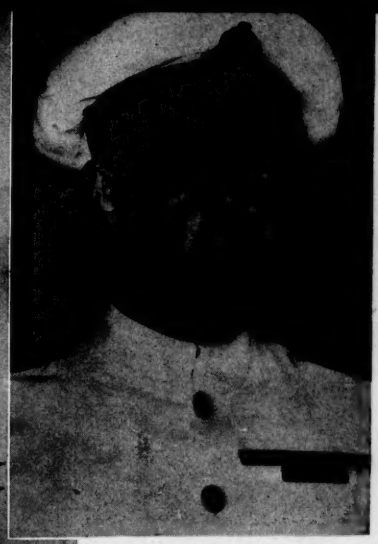
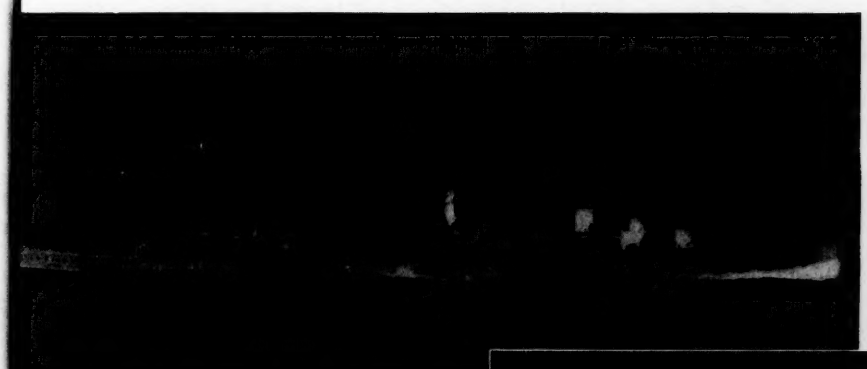
The British 32 knot cruiser Exeter, displacing 8,390 tons and mounting six 8 inch guns



Commodore Sir Henry Harwood, K.C.B., Squadron Commander

—Wide World



The British 7,000 ton, 32 knot cruisers Ajax (left) and Achilles which with the Exeter engaged the German pocket battleship Admiral Graf Spee off the River Plate. Each of these cruisers carries eight 6 inch guns and eight 4 inch anti-aircraft guns.

—Wide World

XUM

The German 10,000 ton, 26 knot pocket battleship Admiral Graf Spee and her Commander Captain Hans Langsdorff

—Pictures and Wide World

Spee's main battery (and soon even some of her 5.9 inch guns) heavily engaged till she herself had but one gun left able to fire, and that only by hand loading.

By then the *Exeter,* afire fore and aft, was a shambles, with 61 killed and 23 wounded, and helpless to keep up, dropped out of action astern. But nevertheless she had won, for while the *Graf Spee* was grimly cutting her to pieces, the *Ajax* and the *Achilles* on the seaward side, according to Langsdorff's own account, to his astonishment "risking more than seemed credible" in the presence of his heavy guns, darted through skillfully laid smoke screens at short range in lightning salvos to shower the *Graf Spee* with 6 inch shells and escape behind the smoke before her heavy turrets could be trained on their rapidly shifting hulls.

From Langsdorff's statement, they did "enormous damage," riddling the *Graf Spee's* unarmored bow, wrecking her superstructure, disabling the ammunition hoists to her forward turret, penetrating her belt armor at the water line, and worst of all, putting two 6 inch shells through her fire control tower, thereby cutting the communication cables and smashing the *Graf Spee's* fire control system on which the volume and accuracy of her fire depended.

So when the shattered *Exeter,* unable to keep up, fell out astern, it was the armored battleship *Graf Spee,* outmaneuvered and outshot, not her two tin-clad cruiser opponents, which had had enough and which sought to break off action and flee. The rest of that weird day was a running fight with the *Graf Spee* racing southward for Montevideo and the shelter of that neutral port, and the *Ajax* and *Achilles* tenaciously clinging to her as she fled, darting in through smoke screens occasionally to let go more salvos, until as evening fell they managed to get inshore of the *Graf Spee,* cutting her off from the River Plate, and still firing, to force her southeastward off the coast.

Not till nearly midnight when darkness hid everything did the harassed *Graf Spee,* doubling suddenly, manage to come about for Montevideo; and with her two dogged pursuers still firing on her right up to the last moment, she dashed headlong into Uruguayan waters, a thoroughly beaten ship, never again to emerge except to be scuttled by her own captain a few days later.

To every seaman steering a ship over the seven seas, guided by a Sperry Gyro-Compass, the wreck of the *Graf Spee* off the mouth of the River Plate has a peculiar significance. For in the nearby water off the Argentine coast to the southward, an early Sperry Gyro-Compass figured prominently in the most important day in the career of that Vice Admiral Graf von Spee for whom Langsdorff's ill-fated ship was named.

It was in November, 1914. In Vice Admiral Sir Doveton Sturdee's cabin aboard H.M.S. *Invincible,* about to undock in Devonport, a sombre group of officers was gathered. A few days before Britain had suffered in the south Pacific its most crushing naval defeat in over a century. Off Coronel, Chile, in the fading light of a cold November evening, Rear Admiral Sir Christopher Cradock with the heavy cruisers *Good Hope* and *Monmouth* had vanished beneath the waves of the Pacific, overwhelmed by the thundering salvos of Vice Admiral Graf von Spee's squadron of heavy armored cruisers, *Scharnhorst* and *Gneisenau,* backed up by his light cruisers, *Leipzig, Nurnberg,* and *Dresden.* From the devastating fire of that squadron only the light cruiser *Glasgow* of Cradock's three warships had managed in the night to escape. And now all the south Pacific, as well as the South Atlantic should he go there, lay at Vice Admiral Graf von Spee's mercy. Not an allied merchantman on either coast of South America dared sail.

Swiftly then "Jackie" Fisher, First Sea Lord, acted in that crisis. Secrecy, gunpower and speed were essential for success. Secrecy the Admiralty would take care of. To provide the gunpower, Fisher snatched the battlecruisers *Invincible* and *Inflexible* from Jellicoe's Grand Fleet, gave them to Sturdee. To insure the speed, he or-

dered Sturdee with the utmost haste to sail at once with his fast cruisers southward to meet von Spee, disregarding all else.

Inflexible was ready to go. But the *Invincible,* flagship, only partly repaired that day for distant service, was nevertheless coming out of dock, still with the dockyard mechanics laboring on her so urgent was the need for despatch, under peremptory orders not to await completion of her repairs but to take the dockyard workers to sea with her to finish on the way to Cape Horn. Even an hour's delay was not to be risked lest von Spee break out into the Atlantic before Sturdee arrived to block him.

But now there was a serious hitch in the plans. With furrowed brows Admiral Sturdee and his assembled officers listened to the Admiral Superintendent of the Dockyard declaring that *Invincible* could not yet proceed. Between the drydocking and other changes and repairs which had ruined the adjustment of her magnetic compasses, they were wholly unreliable, and until they could swing ship to compensate them he dared not let them sail lest the ship, with inaccurate compasses, be lost blundering on a rock in the winter fogs. Till they had swung ship for compass compensation, the squadron must wait.

But it was already late afternoon, the wintry sun was gone, swinging ship would have to wait for tomorrow (perhaps longer if the weather was bad), and at the best a day's delay in sailing was inevitable, possibly more. There was no out, delay or no delay, save to wait to compensate those magnetic compasses.

Stoically Admiral Sturdee took the blow. Nothing for it but to annul sailing orders and wait to go through the centuries old procedure of swinging ship. For coming on top of a series of recent disasters—the loss of the dreadnaught *Audacious* sunk by a mine, the uncurbed depredations of the raider *Emden,* the entry that week of Turkey into the war on the side of the enemy, finally the crushing defeat of Cradock by von Spee at Coronel—he could not risk the effect on British morale, already shaken, of a possible standing of the *Invincible* because of her erroneous compasses.

The *Invincible's* navigator, fidgeting a little nervously at his own temerity, made a suggestion.

"Admiral, I believe we *can* sail safely without swinging ship if you'll approve. The *Invincible* here has a gyro-compass—one of the first half dozen of those new Sperry gadgets recently purchased for the fleet. We've had ours aboard two months now, and I'm convinced from what I've seen of the way that compass works, we can rely on it to take us through. That 'Sperry' doesn't need any compensation or swinging ship for corrections; it points true north on any course and it's already up to speed, pointing true north now. I'll stake my commission that it will stay that way. We can go out on that gyro compass—I'll get the magnetics adjusted as best I can during our run south!"

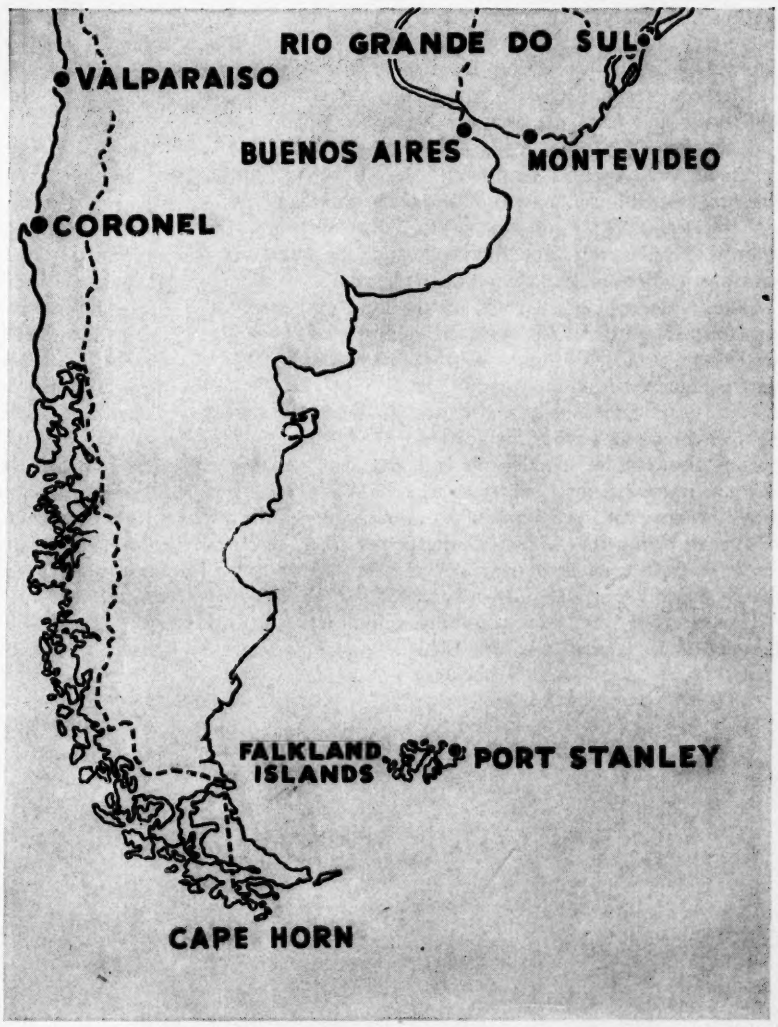
Sturdee looked quizzically at him. Sail on a long cruise with uncorrected magnetic compasses, known to be badly in error? No mariner had done that in centuries. But the need was unprecedented. Questioningly the admiral turned from the *Invincible's* navigator to her captain.

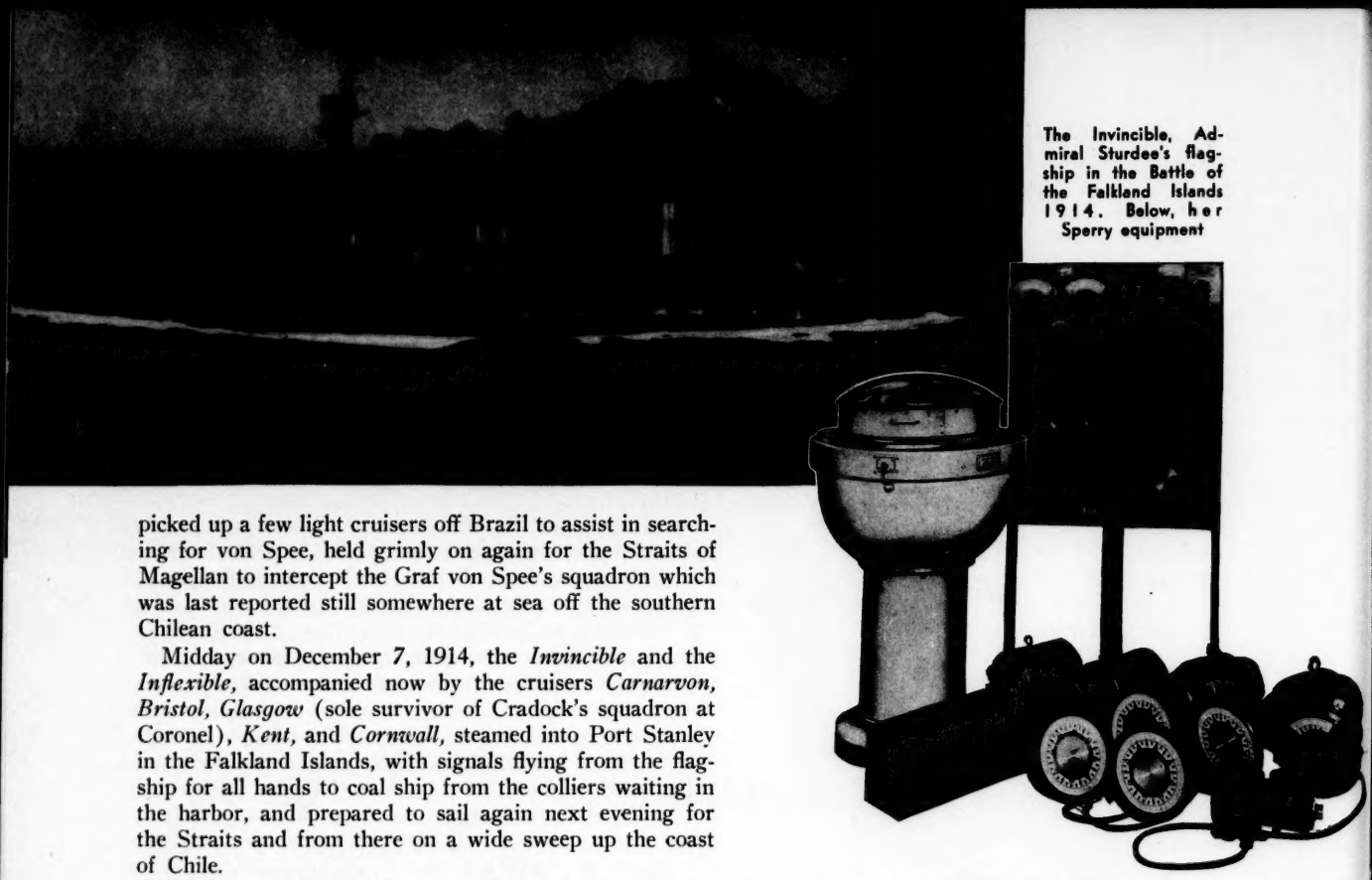
"Agreeable to you, sir?"

"Aye, aye, sir. I'm willing to take my navigator's word; I've as much faith in him as he seems to have in his gyro-compass."

And so without delay, the *Invincible,* moving out of drydock, kept on to sea, with the *Inflexible* following in her wake.

Across 7,000 miles of ocean, navigating all the way by gyro-compass, never slackening speed except to coal en route, the *Invincible* and the *Inflexible* raced southward,





The Invincible, Admiral Sturdee's flagship in the Battle of the Falkland Islands 1914. Below, her Sperry equipment

picked up a few light cruisers off Brazil to assist in searching for von Spee, held grimly on again for the Straits of Magellan to intercept the Graf von Spee's squadron which was last reported still somewhere at sea off the southern Chilean coast.

Midday on December 7, 1914, the *Invincible* and the *Inflexible,* accompanied now by the cruisers *Carnarvon, Bristol, Glasgow* (sole survivor of Cradock's squadron at Coronel), *Kent,* and *Cornwall,* steamed into Port Stanley in the Falkland Islands, with signals flying from the flagship for all hands to coal ship from the colliers waiting in the harbor, and prepared to sail again next evening for the Straits and from there on a wide sweep up the coast of Chile.

Where was Admiral Graf von Spee? Nobody knew. The last authentic report was of one of his auxiliary cruisers, the *Prinz Eitel Friedrich,* off Valparaiso, but the whereabouts of von Spee himself and his marauding squadron were shrouded in complete obscurity.

Coaling started with a rush, on the light cruisers first, kept on through the night, with the colliers as dawn broke on December 8, shifting alongside the battlecruisers to start coaling them.

With coaling feverishly under way on the ships hardly eighteen hours in harbor, at 7:50 A. M. from the signal station above Port Stanley flashed the word that two German warships, the *Gneisenau* and the *Nurnberg,* were rapidly closing on Port Stanley from the south, with heavy smoke covering the whole southern horizon! Admiral Graf von Spee's whole squadron was steaming up to raid the supposedly defenseless Port Stanley!

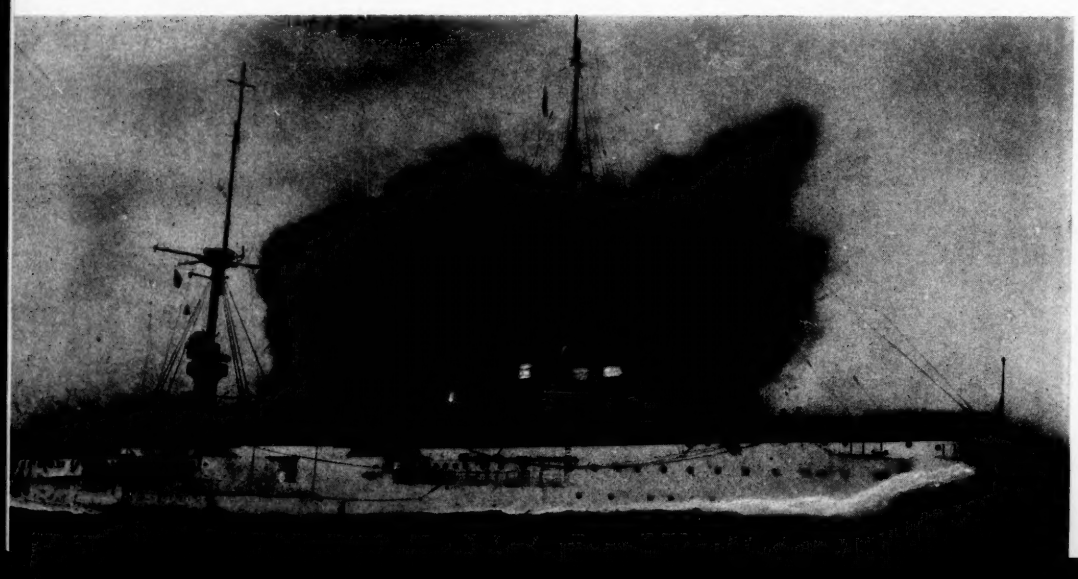
Hastily from every ship inside the colliers were cast off, the coal aboard frantically shovelled below to clear decks for action. In the firerooms of the anchored squadron, sweating stokers fought frenziedly to raise steam, while up to the *Invincible's* yardarm fluttered the signal,

"PREPARE TO WEIGH."

Never will it be known which was the more surprised—Vice Admiral Sturdee, at finding providentially delivered under his guns the squadron he had expected to spend months perhaps in searching two oceans for, or Vice Admiral Graf von Spee, when the first glimpse as his ships opened the headlands and looked into Port Stanley, showed there, instead of an empty harbor or at most a few light cruisers which he could serve as he had served Cradock at Coronel, the unmistakable tripod masts and the 12 inch turrets of two huge battlecruisers which to the best of his knowledge were still with Jellicoe's Grand Fleet, 7,000 miles away in the North Sea!

At that sight, Graf von Spee's two scouts fled incontinently to join their consorts to the south. But by this time steam for maneuvering had been raised on Sturdee's command, and shortly out from the harbor steamed majestically the *Invincible* and the *Inflexible,* followed by Rear Admiral Stoddart's light cruiser squadron.

Admiral Sturdee made the signal,



The Scharnhorst, flagship of Admiral Graf von Spee, Battle of the Falkland Islands

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"General Chase!"

With smoke pouring in huge clouds from their funnels as they worked rapidly up to full power, the *Invincible* and the *Inflexible* settled down to overhaul Graf von Spee's fleeing ships, now nearly hull down to the southeast.

By 12:51 p. m., making 25 knots, the *Invincible,* the *Inflexible,* and the little *Glasgow,* had worked up to within 16,000 yards of von Spee's huddled group of ships, of which the light cruiser *Leipzig,* apparently the slowest, was sternmost, and Sturdee signalled,

"Commence Firing!"

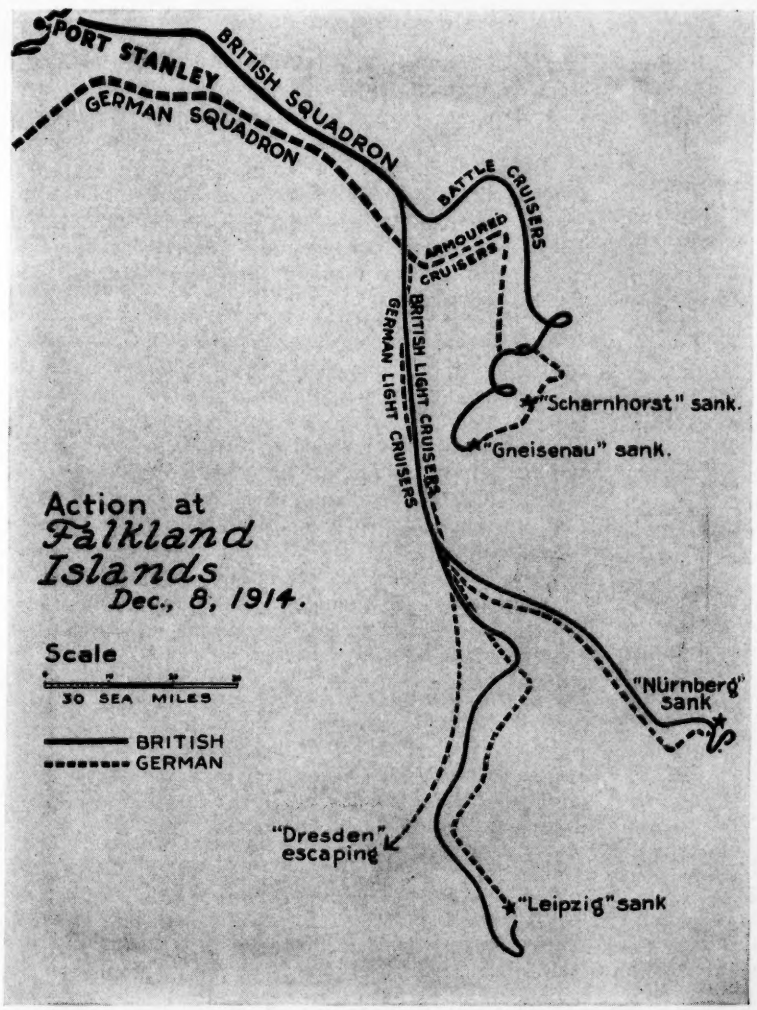
12 inch shells began to straddle the *Leipzig,* and to save her, Admiral Graf von Spee from the *Scharnhorst,* his flagship, bravely signalled the *Gneisenau* to follow him and engage the battlecruisers on an easterly course, while the speedy *Dresden, Nurnberg,* and *Leipzig* were ordered to flee to the southward on diverging courses under cover of his fire and save themselves from the presumably slower but more numerous British light cruisers.

Swinging eastward into line ahead, the *Scharnhorst* and the *Gneisenau,* firing to port, opened with their 8.2 inch guns on the *Invincible* and the *Inflexible* while the three German light cruisers raced southward away from them, pursued immediately by the *Glasgow, Kent,* and *Cornwall.*

Two separate actions resulted. Using his superior speed to keep the range open at around 16,000 yards, but considerably hampered throughout by smoke, Sturdee with the 12 inch guns of his two battlecruisers gradually hammered the *Scharnhorst* and the *Gneisenau* to pieces, the *Invincible* and her sister suffering hardly at all during the process from von Spee's inferior 8.2 inch guns.

Hopelessly outgunned and outspeeded, Vice Admiral Graf von Spee fought doggedly on for three hours, maneuvering constantly in futile attempts to close the range to where his might land effectively, until at 4:17 p. m. his flagship, the *Scharnhorst,* listing heavily, fell out of line, rolled on her beam ends, and with Graf von Spee's flag still flying, sank with all hands, soon to be followed to the bottom by the *Gneisenau.*

The light cruiser action to the southward, with the Germans soon separating, ended almost similarly, except that the *Dresden,* fastest of all ships engaged, made safely off. but only to be caught and destroyed a few months later off Juan Fernandez in the Pacific. The *Glasgow* and the *Cornwall* in a long stern chase extending until nearly 8 p. m. ultimately overhauled and sank the *Leipzig.* The *Kent,* following alone the *Nurnberg* when she parted from her consorts, finally at 6:36 p. m. in a single ship action sent her also to the bottom. As a final touch to complete the day, the light cruiser *Bristol* which had been repairing machinery and so was last of Sturdee's command to leave Port Stanley, by early evening had found and sunk von Spee's colliers hovering to the southward while von Spee closed on Port Stanley.



So, as night closed in on December 8, 1914, ended the Battle of the Falkland Islands, with the annihilation of Admiral Graf von Spee's proud squadron—armored cruisers, light cruisers, even tenders. For the first time since the war had started, Britain was effectively in command of the ocean lanes on which her very existence depended. "Jackie" Fisher had reached 7000 miles across the seas to overwhelm Vice Admiral Graf von Spee with his policy of secrecy, gunpower and speed.

But in that astonishing success, speed had proved the most vital. Had Sturdee in the *Invincible* arrived even twenty-four hours later, he would have found Port Stanley a smoking ruin, his waiting colliers sunk, and von Spee vanished again into the trackless ocean free to raid the Atlantic, his squadron, bunkers empty of coal after a long voyage, helpless to coal again and start immediately on any protracted pursuit.

By. saving that crucial day at the start for the *Invincible,* the unique qualities of her Sperry gyro-compass played a part in

(*Continued on page* 48)

SCOUTS!!
Information Please

BY CAPTAIN D. M. SHOUP, U.S.M.C.

INFORMATION! Every commander must have it. Every commander must take the necessary steps to get it. Then, he must make intelligent use of it. Else, according to history, success will not be associated with his name.

From Moses to Franco successful leaders of expeditions have unceasingly dispatched emissaries to procure essential information of their opponents and the terrain occupied by them. It appears, without exception, that the degree of ultimate success of these leaders, in the conquest of their foes, has been directly proportional to the proficiency of their scouts.

Let us come closer home. Closer to the present moment. Let us open the door to our own educational structure. Are we to learn that a commander needs information? Do our teachings entreat us to lean heavily upon this factor in our decisions and actions?

Let us look into one of our pamphlets dealing with tactical doctrines. What do we find within the various paragraphs about information? Here are a few extracts:

"In order that the commander may have full liberty of action, it is **necessary*** that he be **informed,** not only of the outline of the enemy position . . ., but also the depth of the enemy position and his activity."

"To cope with these dangers, there **must** be a constant search for **information**."

"A commander bases his dispositions upon timely **information** of the enemy."

"It is evident that **information** of movements of an enemy mechanized detachment **must** reach the commander. . . ."

"Each commander **must,** therefore, have agencies at his disposal which will permit him to gather **information**. . . ."

"The decision **will** depend largely upon available **information**."

"**Information** must be transmitted promptly from front to rear and from rear to front."

"The decision to attack, defend, or to avoid conflict is governed by . . . (2) The capabilities of the enemy based on the latest **information**."

"The selection of the form of attack is made after a consideration of the situation as determined by **information** obtained as a result of thorough reconnaissance."

Thus it is that such statements appear some twenty times in as many pages of an instructional pamphlet dealing with offensive combat. We note, too, that these are given to us as MUSTs and not as SHOULDs.

It is not to belittle the necessity for information in the defense that excerpts were taken from our instructions for offensive combat. Rather, it is because we all know the part that offense plays in the gaining of victory in battle. Knowing this, we can very rightfully conclude that to win battles, and thereby wars, commanders must have proper information if they are to make sound decisions. Certainly, this is the kind of decisions upon which successful maneuvers are based.

Granted, that adequate information **must** be obtained, just what is the essential information needed for an operation, or phase thereof, that the commander has decided to execute? The commander must decide this, assisted by the recommendations of his intelligence officer. Once decided, the intelligence officer must consider the agencies available for the obtaining of this information, and the capabilities and limitations of these agencies. He then must assign to them missions for the collecting of certain specific data.

With the advent of modern warfare, there has come a great increase in the kinds of agencies that are capable of obtaining information of the enemy and the terrain. Some of these are: radio goniometry, aircraft (observation and photography), sound and flash batteries, and submarines. However, just as the modern supporting arms have not replaced the infantry as the backbone of an army, these modern collectors of information have not replaced the age-old scout. On the contrary, they have probably increased his importance. He must now be used to seek information for corroboration of the reports of these new agencies. Within the battalion, regiment, and brigade, he will be indispensable far into the future.

It is from the units in contact with the enemy that the flow of the bulk of essential information will originate. It is the scouts that will gather this information. That armies realize this is evidenced by the fact that they have the greatest number of scouts in the battalion, decreasing the number in the higher echelons.

You have only to browse among the recent service publications and you will find editorial comment regarding the added impetus that is being given to the matter of scout-training in our military forces today. There is just one logical interpretation to place upon this. That is, that the importance of the scout has been realized. The necessary

steps are being taken to assure that when THE time comes, there will be an adequate number of the proper type of men well trained in the fundamentals of scouting. Experience has taught the futility of making requisition for such personnel on M-day. And, alas! for the Marine Corps, the spread between M-day and D-day may prove extremely short.

Strip the scout of the romantic haze which often times obscures his real reason for being, and we have simply an information-gatherer. The scout is a specialist. As such, he requires special training. Of what does this special training consist? It consists of school and field training in many and varied subjects. Our training guides enumerate the many things the scout must know and the tasks he must be able to perform. Of necessity, a great amount of the scout's advanced training must be performed in the theater of hostilities. Yet, all the basic and fundamental training must be mastered by the scout prior to entering the combat zone. Of the many things that he must know, it would be highly presumptive to say that any one of them was the **most** important. All are necessary to being a valuable scout and must be a part of the very inclusive education that is his. There is one extremely important subject, however, which can and should be taught the scout long before H-hour. Once mastered, this subject is not easily forgotten. It is called Map Reading.

How important is map reading to those that are to be entrusted to gather vital information for us? Let us again turn to our training guides. These are some of the things we see:

"Scouts **must** be taught the following:

. . . . **Map Reading** . . . ."

"Information which is difficult to describe may be shown accurately on a sketch or overlay. . . . Overlays are made from the **map** in possession of the scout. . . ."

"The scout **must** be well trained in **map reading. Maps** may be used to select covered routes, observation points, and to plan his actions in advance."

"To make an intelligent and useful sketch giving information of the enemy, the scout **must** be thoroughly trained in the art of **map reading**."

This, then, gives us an indication of the connection of map reading to scouting. Note that this relationship is also written with MUSTs.

If scouts are the principal source of information which is so vital to the commander in his effort to see through the "fog of war" and win battles, and if map reading **must** be mastered by these scouts, then it is our duty to take the necessary steps to painstakingly train these men, NOW.

What is the present condition of **your** outfit in this respect? There follows a simple test that will help you to get the necessary information to answer this question. This test can be readily mimeographed for your use. And, to further assist you, the solutions are included.

Be a good scout. Get this information by giving this test to your scouts and NCOs. Evaluate the information thus gained and base your decision upon it. Conclude by taking the necessary action.

A MAP READING TEST FOR SCOUTS

The Requirement.

On the attached map:

1. Give the co-ordinates (two decimals) and the approximate elevation of each of the following landmarks:

a. Church
b. School
c. Graveyard
d. Bridge
e. Road Intersection (SE of Bridge)
f. Road Fork

2. The right flank of your unit is at (237.5—325.5) and the left flank is at (238.0—326.0). Draw a line indicating this position and an arrow showing the direction of the front.

3. Drawn an unimproved road from (238.20—325.65) to (237.20—325.80).

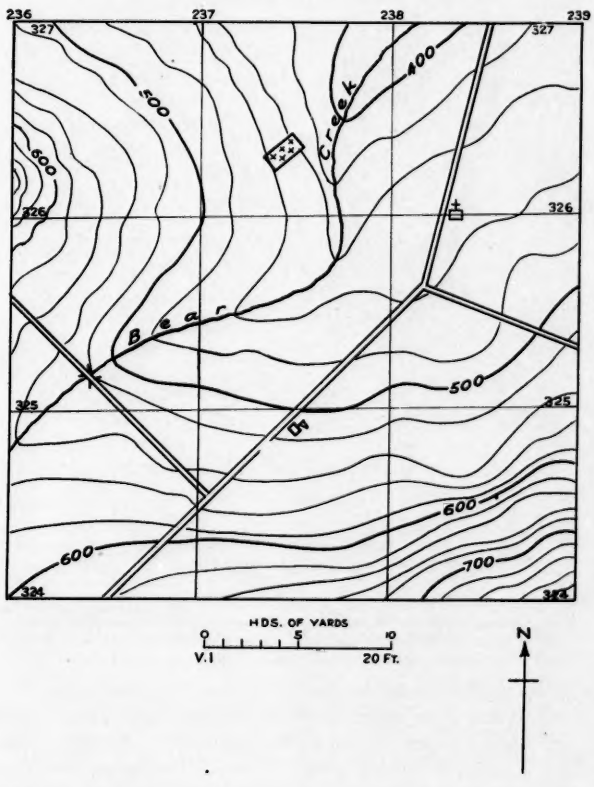
4. In what general direction does Bear Creek flow?

5. From the road intersection (237.1—324.6) northwest along the road to the bridge place conventional signs indicating a smooth wire fence on the northeast side of the road and a barbed wire fence on the southwest side of the road.

6. Draw a trail from the graveyard to the church. Two points on this trail must be exactly 400 feet in elevation.

7. How far is it (yards) from the church to the school by road?

8. You are at the graveyard. What is the approximate azimuth of (a) the school, (b) the church?



NAME _____ RANK _____

(*For solution see page* 63)

Military Lessons from the Chinese-Japanese War*

GARDED

C. RODNEY SMITH
Captain, Corps of Engineers

Courtesy of *The Military Engineer*, No. 180, November-December, 1939

Man does not live long enough to profit widely from his own experience; rarely is he wise enough to profit from the experience of others.
—FROM AN OLD CHINESE PROVERB.

WHAT military lessons of profit to officers of a modern army are to be found in the experience of the Chinese and Japanese in their undeclared war, now in its third year? The vast disparity between opposing forces and the peculiar characteristics of Oriental combat have resulted in tactics and technique often inconclusive as experience upon which first class armies could build soundly. Hence, many observers mistakenly have concluded that valid military lessons could not be drawn from this most recent Asiatic war. But, actually, even without the detached perspective and verification of data which the passage of time brings to studies of military history, careful analysis of the strategic operations of the Chinese war vividly reveals many clearly defined lessons worthy of record. In all military history, lessons universally applicable as experience for future war are found chiefly in the realm of strategy, even when, as in China today, conclusions concerning tactical details are not always trustworthy. Study of the true strategic operations in China is particularly interesting in disclosing why, despite endless victories in battle, the Japanese leaders did not inflict decisive defeat upon the main body of the Chinese army, and were unable to bring the war to a quick and completely successful termination.

Figure 1. Encroachment of Foreign Nations into Chinese Territory, Prior to 1937

The seemingly accidental clash of Japanese and Chinese outposts during July, 1937, initiated a swift series of bitter encounters which spread rapidly into a general war for which the stage had long been set. Instead of the quick and easy success which the Japanese expected from a localized "incident," the conflict swept on into a prolonged and savage war of major proportions and doubtful outcome, until its theater included most of the vast country of China and its successful prosecution increasingly demanded the full resources of Japan.

CHINA'S SURPRISING NATIONAL UNITY

No study of the Chinese war is valid unless the question of Chinese unity is kept always in mind. An unforeseen factor which greatly shaped the course of the war, this national unity remains today an uncertain element which will vitally affect the war's ultimate outcome. From the very beginning, China surprised Japan—and the rest of the world likewise—by exhibiting a degree of national unity never before achieved in her long history. In previous wars a paralyzing Chinese weakness has always been the division of interests of regional groups, which prevented the formation of an effective united front to oppose invaders. Successive conquerors have been overcome, not by force of arms, but, at long last, by gradual absorption into China's huge population. But in 1937 the invading Japanese en-

*The opinions expressed and conclusions drawn in this article are those of the author, and are not to be construed as expressing the views of the War Department.

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countered among the Chinese masses a new and unfamiliar spirit of unity and nationalism, very different from previous experience.

The amazing growth of the Chinese spirit of national unity tells the story of the modern China which emerged from the troubled period following the 1911 overthrow of the tottering Manchu Dynasty. At that time the vague

International News Photo

China's "First Family," Dr. H. H. Kung, Mme. and General Chiang Kai-shek

Republic of China lacked effective central government; squabbling war lords held sway over local provinces. The new unity had its origin when Dr. Sun Yat-sen founded the revolutionary *Kuomintang* or Nationalist Party to promote three projects: democratic government, a higher living standard for the masses, and nationalism to recover the power lost to foreign governments. For the past century Chinese territory had been increasingly encroached upon. (Figure 1.) Britain had gone into Hong Kong, Burma, Tibet, Nepal, and Bhutan; France into Indo-China; Russia into Mongolia and Turkestan; and Japan into Korea, Formosa, Port Arthur, and Manchukuo.

Generalissimo Chiang Kai-shek

Chinese unity grew as the *Kuomintang* movement spread; slowly at first, then in leaps and bounds as a series of events established Generalissimo Chiang Kai-shek as the "strong man" of China, the symbol of a united nation. Upon the death of Dr. Sun in 1925 enthusiastic followers continued his program unabated. Party control was soon gained by 38-year old Chiang Kai-shek, son of a wine merchant, soldier by choice, and protegé of Dr. Sun, in whose military entourage Chiang had served as a loyal subordinate officer through years of ups and downs. Schooled in the military academies at Paoting and Tokyo, Chiang's experience included a year in Russia studying Soviet methods and institutions, the presidency of the military academy where officers were trained for the new Nationalist army, and leadership of a wing of the *Kuomintang* military forces.

Established as the new party leader, Chiang pushed ahead with crusade-like vigor to establish a strong central government over all China. One by one, local war lords were eliminated—dominated by military force, bought off with plentiful Soviet funds, or brought into the fold by propaganda. In 1927 a central government at Nanking became a reality. Chiang then turned violently anti-communist in return for financial support from Shanghai business men. As a result, thousands of communists were banished from China and thousands more of them were executed in a bloody "purge."

Chiang's early prestige, policies, and subsequent power were greatly influenced by his marriage into the powerful and influential "Soong Dynasty." His wife was the brilliant May-ling Soong, educated at Wellesley College, Massachusetts. One of her sisters was the widow of Dr. Sun Yat-sen; another the wife of the prominent financier and public official, Yale graduate, Dr. H. H. Kung. Her brother, the gifted T. V. Soong, a Harvard graduate, was a leading Chinese banker and prominent Cabinet member. In 1928, as Chiang's power grew, he extended his rule northward and hoisted the white sun of the *Kuomintang* flag over North China and Manchuria. Before the year ended he was inaugurated as president of the Nationalist Government.

In the years that followed he actively carried on intensive programs of education and material advancement designed to unify China. He tightened his hold on provincial leaders. By greatly increasing means of communication he broke down long-existing provincial barriers. Thousands of miles of railroads, highways, telephone and telegraph lines were built; commercial air lines and radio nets were established. He created a new national currency; co-ordinated flood control and famine fighting agencies; improved international

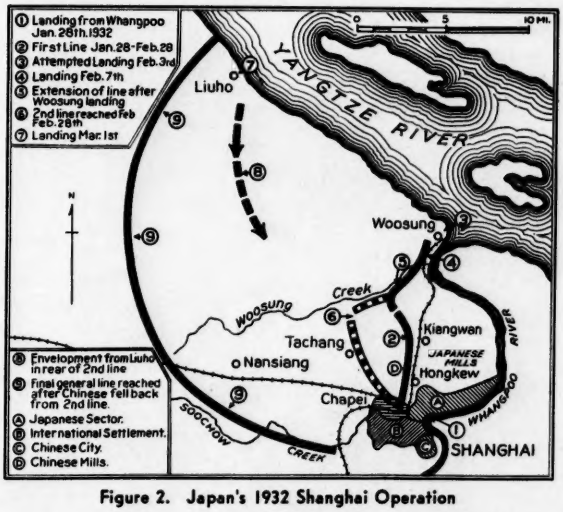

Figure 2. Japan's 1932 Shanghai Operation

relations and regained numerous sovereign rights; encouraged trade and industry; imported German advisers to help train a National army; spread nationalist propaganda; and made war against the remaining communists. These activities served to implant in the people new feelings of nationalism and confidence in Chiang's leadership.

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Japanese Aggression—1931-1933

The process of welding national spirit was greatly intensified by Japanese acts of aggression. In 1931, Japan began a new drive for expansion on the Asiatic mainland. In 1932, all Manchuria was occupied; and Henry Pu-yi, former boy emperor of China, was enthroned as puppet head of the empire of Manchukuo. That same year, Japan landed troops at Shanghai in retaliation for effective Chinese boycotts of Japanese-owned Shanghai cotton mills. There followed warfare of a month's duration.

The invading Japanese, not greatly outnumbered, showed military ineptness despite their superior modern weapons, and suffered a severe loss of "face" when their repeated frontal attacks were stood off by stubbornly defending Chinese. Finally, the Japanese made the obvious envelopment which sound military principles called for from the first. Even then the Chinese army, with its rear threatened and its ammunition exhausted, made an excellent withdrawal unharmed. Japanese infantry-artillery co-ordination had been very poor; tanks had been ineffectual both in the narrow city streets and in the open country criss-crossed with canals; airplane bombing operations had little effect upon military objectives. Japanese attacks had been piecemeal and lacking in deception. The Chinese have made excellent use of successive lines of field fortification defenses which employed well laid out trenches combined with effective sand-bag and wire barricades.

With the eventual occupation of the disputed area and destruction of the Chinese mills, the Japanese reembarked for home. Cotton-mill competition in Shanghai had been wiped out; but Chinese hatred of the Japanese had been newly fanned, and the Chinese will to resist had been greatly encouraged by the sudden realization that the Japanese army was not entirely the invincible force it has been reputed to be. In the following year, 1933, Japan again swelled the rising tide of Chinese resentment by sweeping through the province of Jehol and incorporating that province into Manchukuo.

Chiang's Policy of Non-Resistance

With Manchukuo dominated, Japan next directed her efforts southward, extending her political and economic control into the Peiping-Tientsin area. (Figure 3.) General Kenji Doihara, popularly called "Lawrence of Manchuria," used every means of diplomatic pressure and force, to win over the North China governors and generals and wrest control of the five provinces of Chahar, Suiyuan, Shansi, Hopeh, and Shantung. Troop barracks and airdromes were built at key points and occupied by permanent Japanese garrisons. Puppet or semi-independent regimes were set up which effectively deprived Nanking of valuable Hopeh-Chahar tax sources and created customs loopholes through which Japan dumped into China great quantities of tax-free merchandise. The Japanese military never forget commercial aspects.

Through all this, and despite the anti-Japanese clamor of ultra-patriotic groups, Chiang Kai-shek maneuvered to postpone direct resistance until China might have a better chance to win; in the meantime, he actively planned and prepared his people for the inevitable conflict. Playing for time in which to overcome, at least partially, China's sad state of military unpreparedness, he consented to "demilitarized zones" and "mutual assistance" pacts which gave Japan freer rein in North China, but which avoided the certain suicide of war.

The Chinese 19th Rout Army Entrenched near Chapei, 1932 International News Photo.

Meanwhile, vigorous steps were started to strengthen the power and authority of the central government, make China ready for war, and overcome the indifference of the illiterate masses who still cared little who ruled the country so long as they were left in peace to till their land. Gradually, opposing factions were drawn together, agreements reached with important regional leaders, and provincial indifference slowly overcome, as the nation was drawn into closer unity by the repeated threats, demands, and invasions of the common foe. During 1936 military preparations were intensified and a new note of resistance to Japanese aggression became manifest.

Communists and Chiang Kai-shek Join Forces

Late in 1936, Japan began to feel alarm over the growing strength and unity of China's vigorous new government. Chiang Kai-shek refused to accede to Japan's latest demands and in his own turn insisted upon the cessation of Japanese violations of Chinese sovereignty. Suiyuan and Shansi military leaders stood their ground and repulsed Japanese troop advances. The Chinese people openly showed interest and approval.

Sudden impetus was given the movement to stop Japan when Chiang Kai-shek was "kidnapped" at Sian on December 12, 1936, by his own "Anti-Communist Bandit Suppression Forces." Their military campaign against communists had previously come to a standstill due to gradual acceptance of the propaganda of the Communist "Chinese People's Anti-Japanese Red Army" to stop the fighting of Chinese against Chinese and unite all factions to oppose Japan. Released on December 25 after Mme. Chiang's courageous flight to Sian and her determined negotiations, Chiang thereafter ceased warring with Chinese communists. Compromises and far reaching alliances were gradually worked out. The effect of this dramatic episode with the resultant let-up of anti-Red drives and bolstering of a policy of aggressiveness toward Japan was to rally most of China around their Generalissimo in an enthusiastic surge of nationalism.

For the first time China's thousand and one factions, from die-hard war lords long on the outs with the *Kuomintang* to Communist leaders with prices on their heads, were pledged loyally in common cause. Patriotic sentiment to resist foreign invasion by military force flared high, although actually China was still woefully unprepared for war, and Chiang realistically still tried to avoid it. But Japan recognized the threat to her dreams of Asiatic empire contained in the swiftly mounting flame of Chinese nationalism, and accordingly struck quickly. A year or two earlier, her invasion would have been the swift and easy success anticipated, instead of a long drawn out stalemate; a year or two later Chiang might well have emerged victorious.

Initial Phases of the Present War

Following the clash near Peiping on July 7, 1937, between Chinese sentries and Japanese North China garrison troops on maneuvers, the Japanese moved with dispatch to clear the Peiping-Tientsin area for use as a base of operations. Ports of debarkation were prepared and troops and war supplies rushed into China. Efforts to settle the incident by diplomatic discussions failed hopelessly, the demands and counter demands of each side serving only to intensify their hostile attitudes. It soon became evident that with the rampant anti-Japanese temper of the Chinese, only general war could result from Japanese determination to gain conclusive results in North China. "War follows when diplomacy fails." So it was then: words gave place to blows.

While Chinese troops began to assemble along the railroads, sanguinary bursts of fighting took place. Raids, uprisings, and ruthless reprisals resulted in frightful bloodshed and widespread property destruction. By the end of July, organized Chinese resistance in the Peiping-Tientsin area had been eliminated, the roads and railroads from Peiping to the coast completely dominated by the Japanese, and covering forces pushed some 20 miles south along the Pinghan railroad (Peiping to Hankow) and the Tsinpu line (Tientsin through Suchow to the Yangtze opposite

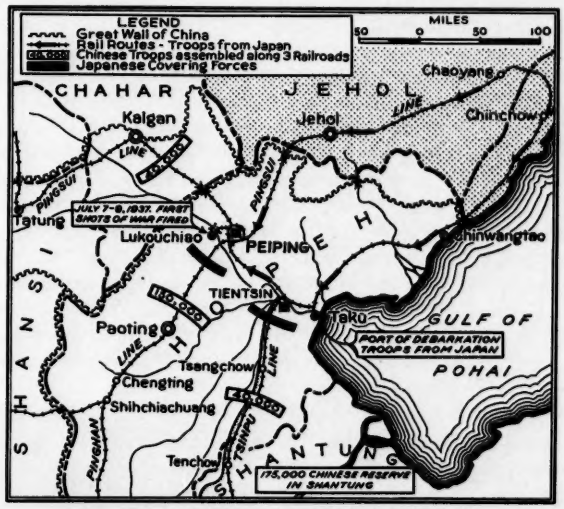

Figure 3. Initial Operations in North China, 1937

Nanking). (Figure 4.) However, then as later, actual Japanese control did not extend much beyond the actual lines of the communication routes, and the invaders were constantly harassed by the activities of Chinese irregulars in rear areas.

The Strategic Situation in August, 1937

After setting her war machine in motion upon the pretext of the July 7 clash, Japan's invasion of China moved smoothly forward in a series of systematic military operations. Various aspects of an apparently well ordered plan of strategy for an offensive war were soon revealed. The immediate objective was to complete by force the detachment of the five North China provinces from control of the Nanking government. Long intrigue had paved the way for setting up a docile, Japanese-dominated puppet regime. In these five provinces Japan would acquire rich coal and iron deposits, gain access to valuable cotton growing districts, and give China's "Open Door" a shove by insuring exclusive Japanese markets for the area's 80,000,000 population. Another tremendously important result would be the creation of a buffer state to give Japan's traditional feudalism added security from the menace of communism.

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Essential raw materials, a reserve of manpower, and a base of operations would be provided for any possible future anti-Soviet drive to push Russia back from the dangerously close proximity of her Vladivostok submarine base and easy bombing range of every important city in Japan.

Japan's military operations embraced the following strategic conceptions:

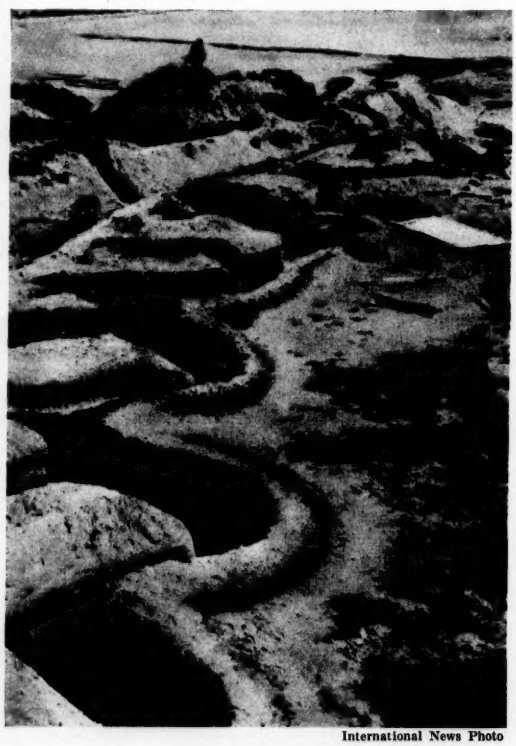
(1) Establishment of a base in the Peiping-Tientsin area, from which operations might be launched to the south and west. This was accomplished successfully within the first month.

(2) Launching of a main attack southward from the North China base, with the objective of conquering the five provinces sought and crushing Generalissimo Chiang Kai-shek's national army so as to destroy his Nanking government, the major obstacle to Japanese domination of China. For complete success Chiang's forces had to be held near the coast until decisively defeated. If permitted to escape to mountainous western China, or driven into the arms of the Soviet, their annihilation would be impossible, and they might be able to wage endless guerrilla warfare fatal to Japan's economy. By what errors did the Japanese fail in their mission of destroying Chiang's armies?

(3) Launching of a diversion, or secondary attack, at Shanghai for the purpose of attracting Chinese forces from the North China theater, aiming a blow at the financial heart of China, capturing the Far East's richest trade center, cutting off Chiang's principal source of revenue, and enhancing Japanese world prestige. Successful co-ordination of the main attack from North China and the secondary attack at Shanghai might pin Chiang's main armies between two forces making it possible for a smashing defeat to be administered.

(4) Protection of the main effort in North China by a movement to the west to secure that flank and drive a wedge between Soviet Russia and China. The subsequent activity and effectiveness of General Chu Teh's ex-Red army soon demonstrated the wisdom of the decision to send security forces to this flank.

(5) Cutting of China's supply lines: by troop movements to shut off overland routes from Russia, by naval blockade to stop the flow of munitions through seaports, and by diplomatic pressure to deny routes through Indo-China and Burma. The naval blockade was begun August 25. Japan's prompt action to stop supplies was eminently sound. A most fatal Chinese weakness was her extreme lack of an adequate munitions industry. Her effective participation in a major war was utterly dependent upon obtaining continuing supplies from outside sources.



International News Photo

Chinese Trenches, North China, 1937

(6) Air bombardment of far flung Chinese cities to discourage outlying provinces from aiding the central government, to terrify the populace, and destroy their will to resist. As the war unfolded, events proved that this policy had exactly the reverse effect.

Correct Chinese Strategy

Because of the Japanese army's vast superiority to China's heterogeneous assortment of mediocre and poorly equipped troops, China's correct strategy was to refuse to accept decisive battle where the superior enemy equipment would be at its best advantage. China's proper course was to utilize her vast country to draw out and disperse the invader, prolong the war, and slowly exhaust Japan's resources. Chiang needed to conserve his limited war materials and best troops while building up his country's latent strength. He had the difficult task of holding his scattered provinces together through long retreats in the face of Japanese efforts to foment discord and undermine the apparent but untested "unification." He had to maintain finances and supplies despite large losses of territory. His people might turn from his leadership, if his armies gave way too rapidly or exacted too small an enemy toll as they fell back. Would he be able to strike a proper balance with his loosely joined and unwieldy forces? Would his troops have the skill to fight a war of attrition by delaying on successive positions and yet avoiding decisive engagements at the hands of the highly organized, expertly schooled, and highly mobile Japanese troops? Study of the strategic movements of the war discloses that the Japanese failed to break up the Chinese strategy and force strategically decisive battle.

The Battle of Nankow Pass

In August, 1937, the Japanese initiated their excellently conceived movement to the west flank to provide security from both Cihna and Russia for their subsequent main attack south, and to cut overland supply routes from Russia. A mechanized Japanese force moved directly along the Pingsui railroad toward Nankow. Simultaneously a force of Mongols under the guidance of the Manchukuoan Kwantung army made an enveloping movement from the northeast toward Kalgan. (Figure 4.) The Chinese engineers had prepared strong defenses in the narrow Nankow defile. Against these the Japanese foolishly launched furious and repeated frontal assaults. The Chinese held in a determined resistance. Finally, convinced of the futility of frontal attacks against machine guns well emplaced in a mountain defile, the Japanese sent small enveloping forces around the main pass,

over rough mountain trails. In doing so, they discovered the erroneous system of the Chinese defenses—insufficient depth of main defenses and lack of protection of adjacent flank approaches where relatively small forces could have been effective in discouraging attempted envelopments. This erroneous system of Chinese fortification appears again and again throughout the war. Their engineers knew

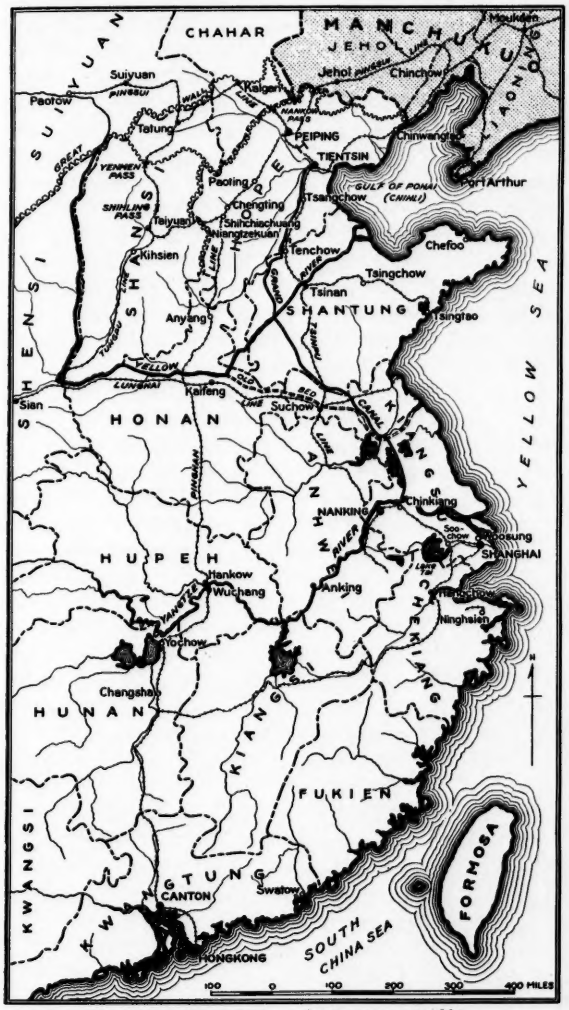


Figure 4. General Map of War Areas in China

details of fortification, but lacked knowledge of strategic defense. About the time the Japanese discovered the weak flanks of the Chinese at Nankow Pass, the Mongols captured Kalgan in the Chinese rear. To avoid capture in the jaws of the threatening pincers, the Chinese abandoned the Pass, dynamited the railroad tunnels, and eluded capture by retreating to the southwest. Two weeks elapsed before the Japanese could put into service the railroads through the Nankow tunnels. Just for the sake of comparison, it is interesting to note here that if the Belgian engineers had similarly wrecked the tunnels at Liege in 1914, the course of the World War might have been altered materially.

Japanese Armies Start Main Movements Southward

The Mongols and Japanese on the north and west flanks continued to push forward against feeble resistance until they overran all Chahar and Suiyuan, set up the puppet state of Mongolkuo, and started advancing into Shansi. (Figure 4.) By mid-September, the Japanese felt safe in launching their main drive southward with two strong Japanese armies, heavily reinforced in artillery, aircraft, and mechanized units.

Almost immediately the Chinese on the Tsinpu front employed a type of defensive obstacle which on many occasions throughout the war proved to be extremely effective —namely, inundation. Following heavy rains, the Chinese cut the dikes of the Grand Canal, flooded large areas, and greatly hampered the advance of the eastern army. At the same time the Japanese army on the Pinghan Front was delayed by swollen streams and muddy roads. With their transport motors mired down and inadequate provision made for road maintenance, the invaders were able to maintain supply only by resorting to the hire of local Chinese carts. The Japanese next encountered a Chinese defense line of concrete pillboxes and rough field works stretching from Paoting to Tsangchow. Severe fighting was required to drive the numerically superior Chinese out of this position. The operations were as at Nankow Pass. The Japanese attempted frontal attacks and suffered severe losses; but the shallow line of defensive works lacked the depth and successive line of a properly designed defensive position, and was easily outflanked by small enveloping forces. At Tsangchow, on September 24, the eastern army gained the position and swept on south; on the same day, at Paoting, the Chinese found their rear threatened, blew up the railroad bridges, and withdrew in orderly retreat behind vigorous rear guard action.

By the end of the month both Japanese armies had reached a second Chinese defensive line extending from Chengting to the Shantung border near Tenchow. (Figure 5.) Early in October the Japanese penetrated the defenses at the Shantung border. As they continued their advance, again the Chinese cut canal dikes and flooded the countryside. This obstacle, together with the series of raids and counterattacks launched by the Chinese under the able leadership of newly arrived General Li Tsung-jen, of whom we shall hear more later in the 1938 Shantung campaign, held the eastern army north of the Yellow River until late December.

Chinese Defense of River Line

Near Chengting the Chinese engineers utilized the high steep banks and wide channel of the breast-deep Huto River to organize a strong and heavily fortified river defense covering Shihchiachuang, an important railway junction where the Pinghan railroad connects with the narrow gauge Tungpu line in Shansi. On October 10, the Japanese accompanied a spirited frontal attack with a heavily concentrated artillery bombardment. The stubborn defense stopped them in their tracks with heavy casualties. During the night the Japanese sent an enveloping force through rough mountain country to the west beyond the Chinese left. There they threw a covering force across the river and established a bridgehead. Next morning they built a ponton bridge, brought artillery across, and while continuing to engage the Chinese frontally, suddenly launched a surprise envelopment. Thrown into confusion, the Chinese

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hastily evacuated the position that had been almost impregnable to frontal attack, and the Japanese captured the railway junction and the reserves of war materials stored there. Once again, we see failure of proper conception of defenses. The Chinese selection of the river as a defensive obstacle was good; they fought with bravery and persistence; their withdrawal without decisive defeat was skillful; but they failed to provide flank security, had no information of the enemy's movements, had no successive lines in their defensive works, and had no large reserve in readiness to move against any crossing in force. However, criticism of the Chinese must be tempered with the realization of their ever present lack of artillery, ammunition, and other means of waging modern warfare. In the pursuit of the hurriedly retreating Chinese troops, Japanese air attacks took a large toll. The Japanese stopped at Anyang, and throughout the remainder of 1937 made no further advance south. Deep in enemy territory with limited forces, they now applied their efforts to consolidation of their gains already made.

Japanese Drive against Shansi Fortifications

Meanwhile the Japanese had moved against the Great Chinese Wall defenses protecting Shinsa on the north and east. Since September, 1937, troops moving south from Tatung had been stopped in front of elaborate "million dollar" fortifications built at Yenmen Pass before the war. Immediately after the battle of Chengting, a Japanese column had moved west along the narrow gauge railroad leading into Shansi. Stopped at the border by well made and strongly manned defenses at Niangtzekuan Pass, the Japanese attempted frontal assaults, but for days were unable to advance a foot. About the middle of October the Japanese on the north outflanked Yenmen Pass and forced its defenders to retire from their now useless fortification. (Figure 5.) At Shihling Pass, the Chinese took up a new delaying position. While the Japanese doggedly hammered away at both Niangtzekuan and Shihling, Chu Teh's efficient ex-Red army successfully raided their communications and temporarily cut off supplies. For a while, isolated Japanese groups were entirely cut off and had to be supplied by airplane. The Japanese on the eastern border were clothed in summer uniforms and suffered severely in the bitter cold of the mountains.

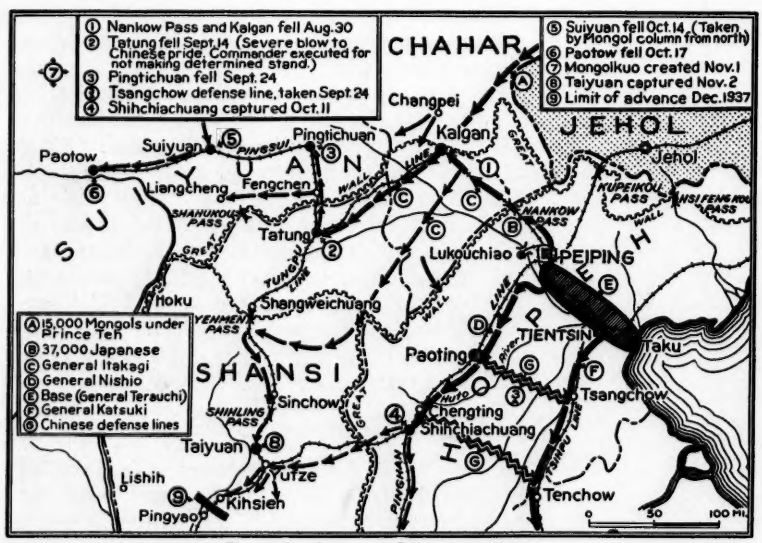

Figure 5. Japanese Operations, 1937

Eventually, as in so many previous cases, the Japanese worked around the flanks of the Chinese defensive works and so rendered the hitherto strong positions untenable. As usual, the Chinese engineers had laid out works at carefully chosen points which able and stubborn defense had made practically impregnable to direct attack; but their weakness again was in fortifying only a point. Always, they failed to realize that fortifications are effective only when series of works at key terrain areas are dovetailed together into a deep and interlocking defense system developed with a view to the operations of a mobile field army. However, even though they were at fault in depending upon isolated fortifications, the Chinese nowhere committed the cardinal error of permitting themselves to be shut up therein and besieged. In every case, once their flanks were turned, they shrewdly retired to the next successive position suitable for further delay.

In Shansi, as they fell back from Shihling and Niangtzekuan passes, they destroyed the railroads; then made a determined stand at Taiyuan until driven out by hand to hand fighting and white phosphorus bombs. They then took up a defensive position south of Kihsien. There the Japanese halted and devoted the rest of 1937 to mopping up rear areas in order to safeguard extended communications. Japanese control of the "conquered" areas extended no farther beyond the occupied roads and railroads than the glitter of Japanese bayonets was visible. The interior contained large groups of hostile Chinese, many of whom posed as peasant farmers by day, but by night joined in raids led by Chu Teh's groups.

During November and December 1937, the Japanese advance in North China remained stalled on all fronts. If vigorous offensive operations were to continue, more Japanese troops were needed to overcome the increasing stiffness of the Chinese resistance and their more effective raids on communications and isolated garrisons. But the Japanese high command could not at this time afford to send more troops to North China. The superior Kwantung army was held in Manchukuo as a precaution against possible Russian attack. All other available reinforcements were being sent to Shanghai, where Japan had become embroiled in a major offensive which profoundly affected the future course of the war.

Shanghai Operations in 1937

Two days after a minor clash on August 9 at Hungjao airport (outside Shanghai) between Chinese guards and too inquisitive Japanese marines, a flotilla of Japanese cruisers, destroyers, and an aircraft carrier arrived in the Whangpoo River. Four thousand marines were put ashore

to reinforce the permanent garrison at the Japanese concession. Both sides dug in facing each other in the Hongkew area just north of the International Settlement. On August 13, patrols began sniping at one another. Soon Japanese artillery opened fire. Chinese machine guns replied, and the spectacular and destructive battle of Shanghai began.

Until reinforcements arrived, the greatly outnumbered Japanese clung precariously to their slender foothold, saved only by the International Settlement from being swept into the river. On August 23 newly arriving Japanese troops landed near Woosung, but were met promptly and pushed back to a narrow strip of beach by alert Chinese forces. A few days later a more successful landing was made near Liuho. A beachhead was established toward Lotien, where Chinese counterattacks were held off while some 20,000 Japanese debarked. However, when the Japanese attempted a co-ordinated attack to join up their narrow Hongkew, Woosung, and Liuho beachheads, all surprise was lost. The Chinese held their own at Lotien and their counterattacks again drove the Japanese back almost into the ocean at Woosung. The Japanese suffered heavy casualties from their efforts to take emplaced machine gun positions of the Chinese by frontal assault.

The Japanese were now thoroughly involved at Shanghai. Transports poured troops into the area. A powerful joint attack was launched against the Lotien and Hongkew flanks of the sharp Chinese salient separating the Japanese forces. To escape from the heavy short range artillery and naval gun fire, the Chinese withdrew in good order on September 13 from their temporarily intrenched advance line and fell back to a previously prepared shorter line just east of the Liuho - Lotien - Liuhang - Tachang road. (Figure 6.) While the Japanese gradually increased their forces, the Chinese crowded a half million troops into the area, including most of their best German-trained divisions. Obstinate resistance was presented by this mass of well-trained Chinese troops to the repeated frontal assaults and methodical hammering of the Japanese.

An ideal strategic situation now existed for the Japanese. They possessed dominant air and artillery superiority and had absolute control of the Yangtze River and Hangchow Bay on the flanks of the narrow Shanghai peninsula. Extremely favorable opportunities existed for surprise landings in force deep on the flanks. From such positions, short rapid movements could cut off Chiang's less mobile army, now closely engaged frontally. The Chinese could be completely surrounded, left without means of retreat, and forced into an uneven fight. The result would be their utter destruction as an effective fighting force. Such a victory on top of the rapid advances in North China must surely have enabled Japan to dictate a peace of her own terms. But the Japanese took no advantage of this exceptional opportunity and continued to make their very costly frontal attacks.

Chinese Field Defenses

The maze of alleys, trenches, and barricades in crowded Chapei offered effective defense against infantry, artillery, or air attack. The steaming, coverless plains of flooded rice paddies checker-boarded with canals and creeks made the open country equally ill adapted to surprise attack or the use of tanks or mechanical equipment. The Chinese defenders adapted themselves to the conditions. Throughout their lines they used numerous reinforced concrete pillbox machine-gun emplacements to good effect, especially when concealed inside native buildings. Wire fence obstacles were used in open country, knife rests in street fighting. Coolie labor was used to dig extensive trench systems and antitank ditches. Ten-pound mines and half buried railroad rails with protruding sections sloping toward the enemy were also used in antitank defense. Sometimes very effective, often such obstacles were useless due to failure to cover them with small arms fire, or to being placed in locations which permitted the enemy to detour through adjacent fields. The Japanese infantrymen soon learned to respect the Chinese defenses and after the first few attempts rarely assaulted them until a thorough bombardment by aircraft and artillery. Repeatedly, the degree of success achieved by the Japanese was in direct proportion to the amount of artillery support given, and a large part of the Chinese casualties were inflicted by artillery.

Position Warfare

Through the rest of September and for three weeks in October the Chinese lines withstood attack after attack. Local advances were promptly repulsed by energetic counter-attacks. Japanese support included cavalry, tanks, flame throwers, naval gun fire, 14-inch siege guns, and attack aviation. Air bombing was carried on with greater intensity than during the World War. It did not have the immediate effect of driving troops out of prepared positions, but did gradually undermine their morale and eventually assist in the success of the attacking infantry. The support of the 8-inch naval guns was limited, due to their flat trajectory and to the difficulty of observation. Both

International News Photo

A Japanese Tank Negotiates Wrecked Bridge, Shanghai, 1937

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aircraft and balloons were used for artillery spotting. Cavalry was employed for close reconnaissance and liaison. The meager Chinese artillery accomplished little. Ground observation was difficult since the terrain was absolutely flat, and air observation was soon denied the Chinese. Also, their extreme shortage of artillery ammunition was almost more serious than the lack of guns. Frequently, the commitment of Chinese infantry to counter assaults without adequate artillery support resulted in extremely heavy losses.

Japanese Finally Succeed by Flank Attacks

After two months, with a quarter of a million Japanese troops engaged, the Chinese line finally was broken near Tachang on October 25, 1937, and the Chinese made an efficient night withdrawal from their still intact but now enfiladed Chapei positions.

After three days of intense fighting the line stabilized again along excellent positions previously fortified through Kiating-Naziang-Chenju. (Figure 6.) However, the Japanese had learned to respect the Chinese defenses and defenders, and now turn from direct assault to the open flanks. They made only minor frontal attacks, with numerous feints at landings on both the north and south shores, and then attacked the Chinese unprepared flank on November 7 by making a surprise landing of two reinforced divisions near Chingsan on Hangchow Bay. This force advanced rapidly inland in the face of only light resistance. To protect their suddenly threatened flank, the Chinese first pulled the right of their line back through Sunkiang. Then, as the Hangchow Bay envelopment was additionally

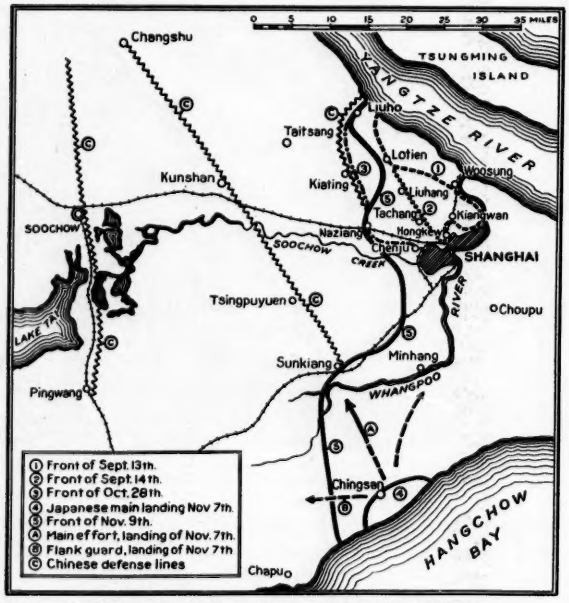


Figure 6. Military Situation, Shanghai, 1937

exploited and new landing threats appeared above Liuho, the Chinese felt their entire line to be endangered and ordred a general withdrawal before their forces should be trapped.

The danger from the flanks, the loss of Shanghai, the havoc caused by intensified and continual Japanese straffing from the air with no response from the grounded Chinese air force, the losses which had piled up through long and aggressive defense against superior weapons, the wounded uncared for because of entirely inadequate medical service, the pronounced lack of artillery and ammunition, and the large numbers of untrained recruits, all combined to create a bad demoralization in the withdrawing columns. As time went on the retreat became more and more disorganized. The superior Japanese mobility became more evident. Co-ordinated Chinese action practically ceased, and the beaten army streamed back toward Nanking, unable to organize effective resistance on any of the successive defense lines, long prepared and of known strength, between Shanghai and Nanking. Chinese attempts at road blocks and bridge demolitions were mostly ineffective, due to inefficient engineering execution and failure to cover by fire. Both sides used ponton bridges and stream crossing expedients to accelerate their movements. The Japanese failed to pursue with sufficient vigor or intelligent planning to take advantage of the Chinese disorganization and inferior mobility. No whole-hearted attempt was made to clinch their victory by utilizing parallel routes to encircle or cut off large bodies of retreating Chinese, although the Japanese navy was steaming up the Yangtze on the flank of the Chinese positions, and a motor boat flotilla was sent across Lake Tai. Considerable abandoned equipment was captured.

Capture of Nanking

Chiang Kai-shek fully realized the impracticability of making a determined defense of Nanking. His army needed reorganization and rest, and was no match now for the steadily reinforced enemy. Anticipating Nanking's certain fall, and lacking means of last minute evacuation across the unbridged Yangtze at their back, Chinese governmental activities were scattered to Hankow, Chungking, and other inland cities about the middle of November. As soon as the Japanese began to close in on Nanking, the best Chinese divisions were withdrawn. Chiang himself left by airplane on December 7. The day following, the crack 88th German-trained division, which had been in the thick of the Shanghai fight, repulsed a frontal attack at the gates of the city and then retreated to the south. Only provincial troops were left behind Nanking's 30-foot walls. The Japanese intensified their air attacks, and poured upon the city fire from naval vessels along the river and from artillery and machine guns placed at points of vantage on the walls and surrounding heights. In the face of these attacks, all pretense at defense crumbled. (The lines of advance are shown on an accompany map, Figure 7.)

The city fell on December 13 and was given over to the invading troops. Wild scenes of panic and disorder prevailed. Thousands of Chinese troops remaining in the city were trapped and slain. Weeks elapsed before order was restored. Meanwhile there was no pretense of pursuit of the beaten and disrupted Chinese forces. Unmolested, Chiang's army was reorganized and rebuilt with remarkable speed as outlying provinces poured in recruits.

Summary of the 1937 Operations

During 1937, the Japanese in China had driven back the

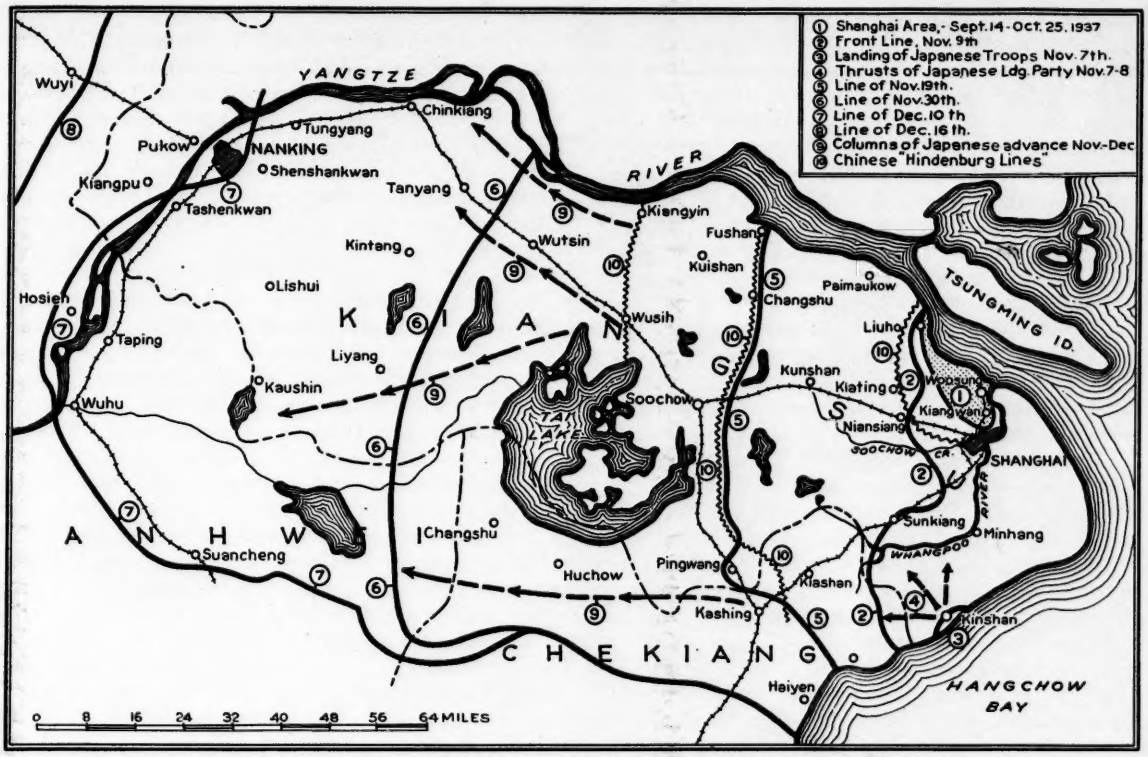


Figure 7. Successive Lines of Advance from Shanghai to Nanking, November-December, 1937

Chinese on all fronts. Without losing a single battle they had overrun an area larger than Germany. Their campaign had been reasonably swift and well co-ordinated. Well qualified subordinate troop leaders had directed an efficient fighting machine which was highly mechanized, had modern tanks and motors, aviation aplenty, as much modern Krupp-type artillery as they could use, and heavy assignments of automatic weapons—615 machine guns per division. Japanese army personnel were imbued with enthusiastic patriotism and loyalty. They possessed a fanatical faith in the invincible prowess of Nipponese arms. Officers and men alike were inculcated with the Oriental disregard for death, held a profound contempt for Chinese military ability, and were firmly convinced that no serious resistance would be encountered.

Again and again, the Japanese defeated much larger forces of the poorly led, half-trained, and ill-equipped Chinese. One of China's greatest military weaknesses, and a prime factor in the little understood inability of that huge nation to stop the Japanese invasion, was the lack of a highly trained, loyal, and efficient corps of officers. Chiang had understood this deficiency and endeavored to correct it, but by 1937 had made insufficient progress in the face of the traditionally peace-loving and pacifist populace who looked down upon the profession of arms as a calling unworthy of the better classes. A second great deficiency was the lack of modern equipment. The army was practically without aircraft, tanks, antitank weapons, mortars, motors, artillery, and artillery ammunition. Even their rifles and machine guns were of all makes and ages. With these handicaps, Chinese soldiers naturally lacked the morale and *esprit* of their more favored opponents, but like them they were indifferent to death. They possessed amazing endurance and cheerfully withstood untold hardships. They were intelligent, and when properly led, fought with courage and determination. But their deficiencies in the indispensable items of leadership, arms, and training made their continual string of defeats inevitable.

Lessons from Japanese Errors in Strategy

But with all her victories Japan had not won the war by December, 1937. Peace proposals which she then submitted were emphatically rejected by an unbeaten Chinese government. Merely forcing back China's armies had not been enough to enable Japan to impose a quick peace bringing realization of her ambitions in China. *Decisive* defeat of China's military forces was first necessary, and Japan announced that she would continue the war until she had utterly destroyed Chiang's power so that a "fundamental solution" could be reached. That objective already should have been achieved by Nippon's generals. Throughout the year 1937 there had been many opportunities for executing strategic maneuvers capable of inflicting decisive defeats. If the Japanese had seized these opportunities, the war might have been over. In theory, Japanese generals advocated the principle of the Cannae battle of annihilation by envelopment, the strategic pattern hammered home to the German army by the great von Schlieffen and brilliantly exemplified in the famous German victory at Tannenberg. The Japanese rightly hailed the battle of Tannenberg as a model of strategic maneuver; but in practice, the Japanese high command often failed to take advantage of oppor-

XUM

tunities for applying the same Cannae pattern in their strategic movements.

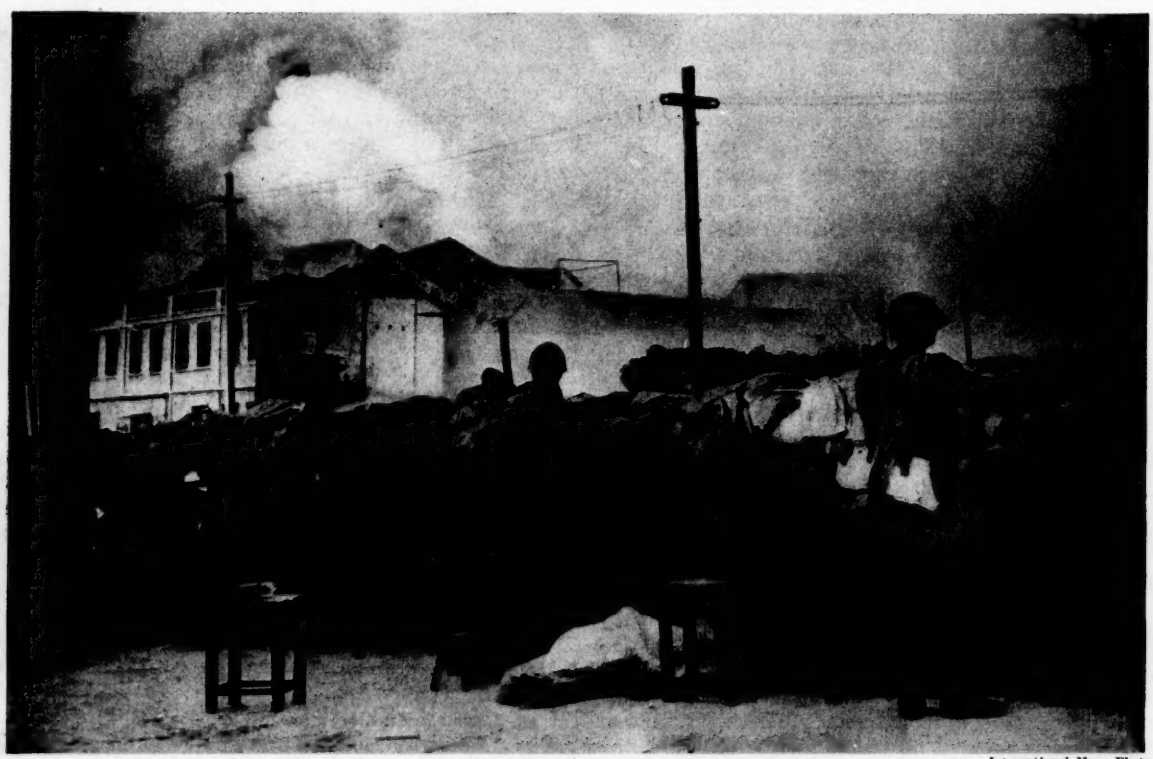
We have noted how Chinese defensive positions generally lacked depth and proper flank protection. The Japanese soon learned how easy it was to surprise the Chinese with an envelopment while fixing their attention with a frontal attack. But in the repeated cases where this occurred the Japanese did not utilize their superior arms and mobility to execute a well planned strategic envelopment with a preponderance of means. Each time they threw away their chance to surround the enemy's main body, cut off his line of retreat, and force him into a decisive and inevitably one-sided battle. Their partial envelopments were always only weak and limited actions with insufficient means to effect encirclement and destruction. Apparently, their only intent was to force the defending troops to retire when frontal attacks had failed to drive them out.

Invariably the Chinese managed to extricate their main body and execute an organized retreat. Consistently, they continued their sound game of delaying on successive positions, avoiding decisive engagements, and conserving war materials. A possible exception was at Shanghai, where, from a purely military viewpoint, determined resistance was contrary to sound Chinese strategy. Other important factors were involved and had to be weighed carefully, but even from the larger viewpoint of the need for extended delay so that divergent political elements might be welded into a solid war front, and the remote gamble that foreign powers might become involved, it is difficult to justify the great expenditure of men and supplies. It played into Japan's hands by enabling her to concentrate her forces where supply was easy and her superiority of materiel most advantageously employed. Furthermore, Chiang took a long chance on being able to withdraw without being cut off in the likely event of Japanese envelopments from the navy-controlled flanks. By standing so obstinately on the Shanghai peninsula the Chinese provided a tempting opening. And the Japanese might have trapped half a million Chinese there, including practically all of Chiang's first class divisions.

Conclusion

With the Japanese high command failing to gain decisive victory, their one other chance of achieving rapid success in China was by breaking up that country's newly acquired "unity" and weaning away Chiang's supporters by conciliatory propaganda and inspired leadership in dealing with war weary civilians in conquered territory. But here again Japanese military leaders lost whatever chance they might have had of winning the confidence and sympathy of the Chinese masses. Brutal treatment of civilians by soldiers, widespread aerial bombing of cities, and the sack of Nanking served to create a deep and lasting hatred of the invader and stiffened the Chinese national spirit and resistance as no peacetime propaganda could possibly have done.

The writer by no means contends that the errors of Japanese generalship of the 1937 operations in China necessarily doomed Japan to ultimate defeat. Such a conclusion does not even follow from the greater errors in the 1938 operations, to be discussed in a subsequent article. Despite the fact that during 1937 and 1938 the Japanese lost their last chance during this war of annihilating any large body



International News Photo

Japanese Soldiers on Duty in Their Improvised Sand-bag Trench, Shanghai, 1937

of the Chinese army, still, Japan's chances of ultimate victory over China remain excellent. However, the contest has become less and less a question of victory through large scale military operations, and more and more one of economic endurance, coupled with the changing relationships and alliances among other powers due to the impact of the war which began in Europe on September 1, 1939. For example, the effect on China's future of the mid-September Russo-Japanese truce in Mongolia may be far-reaching.

But regardless of its ultimate outcome, the war which Japan with her formidable military machine might have won in six months by adhering to proven principles of strategic maneuver, has been dragged out with huge losses and enormous expense into its third year, with the end not yet in sight. The failure of the Japanese generals to bring a swift end to the Chinese war, has dealt the Japanese a staggering economic blow from which they can not recover for years to come.

NEW 75-DRAWBAR HORSEPOWER "CATERPILLAR" DIESEL TRACTOR

Caterpillar Tractor Company has announced a new 75-drawbar horsepower Diesel D7 Tractor, engineered specifically to increase production and lower operating costs.

By adding features which lessen the energy expended by the operator, "Caterpillar" enables the driver to get the greatest amount of work out of the new machine. By improving the design and construction as a whole, the tractor is given longer life and a lowering of upkeep costs.

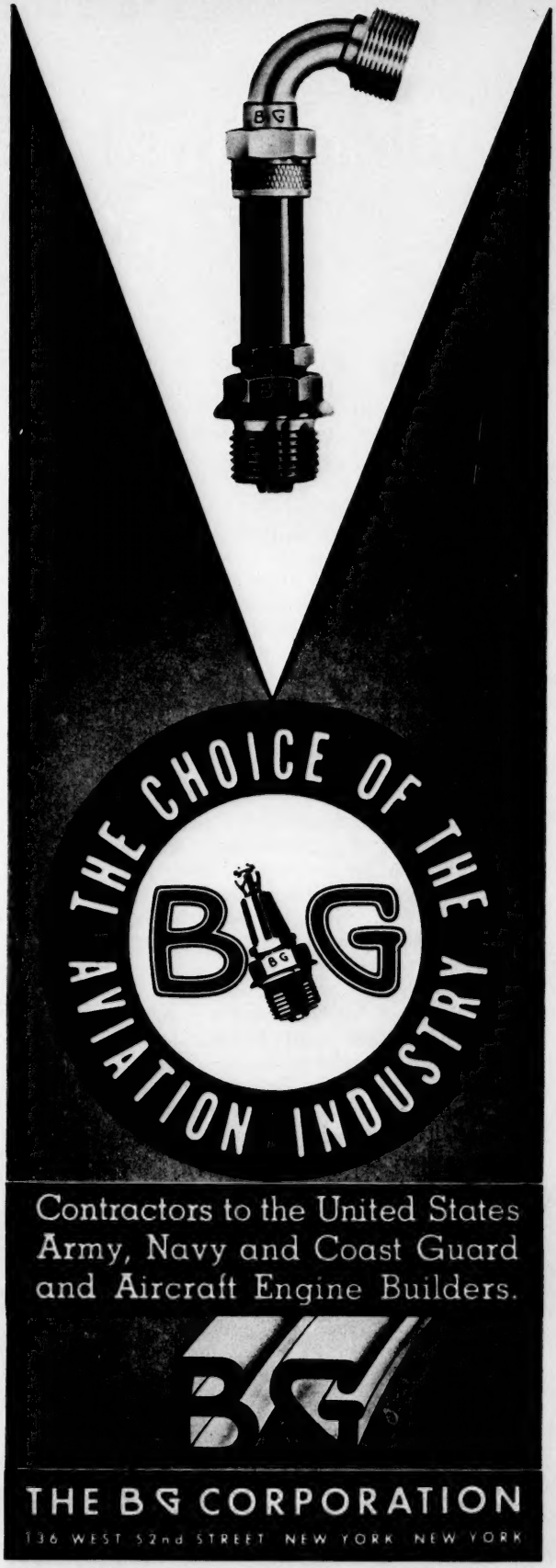
Rounding out its line of Diesel Marine Engines, Caterpillar Tractor Company of Peoria, Illinois, has announced the 25-horsepower Model D3400.

The new engine is especially well suited for lobster, scallop and oyster fishing boats, or for any of the general line of small, open type work boats. It has four cylinders, with a bore of 3¼" and a 5" stroke. Its maximum horsepower output is at 1500 r.p.m., and its rating is for continuous, sustained service.

The new engine brings the line of "Caterpillar" Diesel Marine engines up to six sizes, ranging from 25 to 135 horsepower. Like all other "Caterpillar" Models, the D3400 is offered with an auxiliary gasoline engine as standard starting equipment; but is also available with electric starting.

The unit is characterized by unusual simplicity. There is only one operating adjustment, the valves. Fuel injection equipment is entirely factory set, and requires no adjustment on the job. The injection valves are of the single orifice type, and the size of the opening eliminates the need for frequent cleaning.

The D3400 Marine engine is available with Twin Disc reverse and reduction gears with ratios of 1.62, 2.36, or 3.2 to 1.00; giving propellor speeds of 926, 635, and 469 r.p.m. respectively.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Admiral Byrd Heads South Again

MARGUERITE RUTH

(Courtesy of the Sperryscope)

THE sailing of the *North Star* last month marked the outset of the most promptly organized and most scientifically equipped Antarctic expedition ever attempted. For the third time Admiral Richard E. Byrd is setting out to use American ingenuity to penetrate the mystery of the Antarctic. Since July the Admiral has been the head of the newly constituted United States Antarctic Service. He is being sent by the President with funds voted by Congress to establish claims of the United States to those parts of the Antarctic continent discovered by himself and his fellow American explorers. But the political nature of the present expedition in no way lessens its scientific purposes which are, if anything, more ambitious than those of any previous effort. The Expedition is provided with every means of transportation that it is likely to require, from dog sledges to airplanes, to complete our geographical knowledge of a thousand miles of coast line, mostly still unexplored, and to extend the charted area southward to the geographical and also to the magnetic poles. Finally, means are provided to obtain as complete as possible a knowledge of the area in fields other than geography such as biology, meteorology, oceanography, geology and physics.

In order to carry out this amazingly diversified plan it has been necessary in the brief space of four months to assemble a group of trained and experienced scientific observers and equip them with the most up-to-date scientific instruments. They will have to be housed in prefabricated buildings of an improved design. The personnel of sixty-three men will have to be fed for a year and a half on rations specially designed to maintain efficiency in the Antarctic climate. Finally, the men who will accompany Admiral Byrd in his most remote explorations must be provided with transportation both on the surface and in the air.

The old standby of Arctic and Antarctic expeditions in the transport field was the dog sledge with its limitations in speed and tonnage capacity. This primitive method of transportation is still employed as evidenced by the fact that Admiral Byrd will carry one hundred sixty Alaskan huskies for the use of ground survey parties. In contrast with them he will have three airplanes to increase the radius of observation and provide invaluable photographic data. Unique addition to the Expedition's transportation equipment is the snow cruiser upon which the attention of the newspaper reading public recently has been centered.

To transport this prodigious amount of equipment to its landing place on the barrier ice of the Bay of Whales the Expedition is provided with two fortunately chosen ships. The more famous of these is the *Bear,* veteran of Arctic and Antarctic ventures since it was first bought by the

USS Bear at her pier in the Boston Navy Yard prior to sailing. Above right, her Gyro-Compass, one of the early naval types

XUM

Planning the U. S. Antarctic Expedition in a Washington hotel room, left to right: Dr. Paul Siple, veteran of two Antarctic trips, Lieut. Comdr. Robert A. J. English, U.S.N., Admiral Byrd, Richard Black, Field Representative of the Department of Interior, and William Haines, meteorologist

—Pictures

Navy to figure in the rescue of the remnants of the Greeley Expedition in 1884. Long known to Arctic explorers and whalers in the Bering Sea as the northern outpost of the revenue cutter service, the *Bear* has an enviable record of meeting emergencies under all conditions. Her present duty is to carry Admiral Byrd's Expedition into the Bay of Whales as early as may be, landing the cumbersome equipment on the difficult barrier ice.

During the fitting out the *Bear* was changed from steam to diesel. This necessitated a change in steering gear, and the Sperry Electro-Mechanical Steering System was installed. In the difficult maneuvering with which the *Bear* will be faced in Antarctic waters her steersman will be able, thanks to Sperry "finger tip" control, to put her helm over almost instantly if necessary and return it to any desired angle in a few seconds. In spite of the demands upon space below decks made in this comparatively small vessel by the bulky equipment of the Expedition, no difficulty was found in installing the drum type steering engine with its rugged construction admirably suited to stand up under the exigencies of daily use in ice filled waters.

The *North Star* also began her service in Arctic waters. She was built for transportation of medical supplies and food to Alaska in connection with the activities of the Office of Indian Affairs of the Interior Department. With a gross tonnage of 1,434 tons, twice the *Bear's,* it falls to her to carry the bulk of the necessities of life required by the Expedition. Both ships are fitted with Sperry Gyro-Compasses, which are doubly requisite in such close proximity to the magnetic pole.

When Admiral Byrd and his technical associates set out to design a snow cruiser for the Antarctic, one of the serious problems was how to steer it. The Antarctic continent is as large as the United States and Mexico combined. As far as is known, 85% of this area is a flat smooth plane interspersed with mountainous areas and deeply cracked or crevassed ice. From the point of view of transportation it was necessary to have a unit that could be left out at night without blowing away in a blizzard. It would have to be started in the morning in spite of cold that might reach to a hundred below zero. Its motive power must be applied to some form of traction that would carry its weight over ice and snow.

In case of need it must cross a crevass that might be fifteen feet wide. The Research Foundation of the Armour Institute of Technology in Chicago, under the direction of

The snow cruiser running tests on the sand dunes near Gary, Indiana

—Pictures

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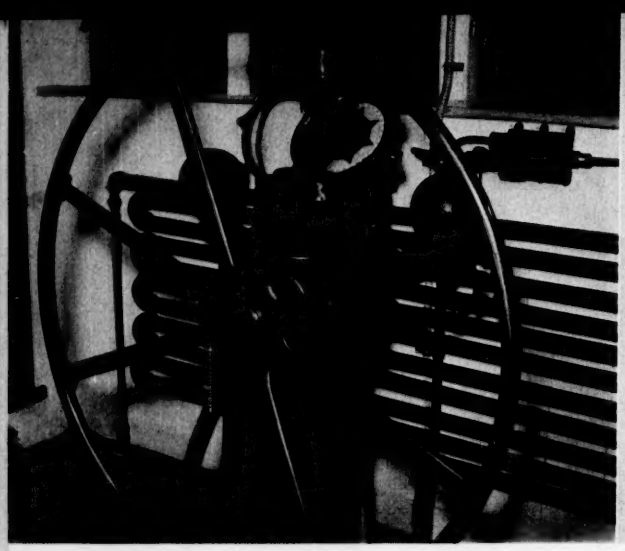
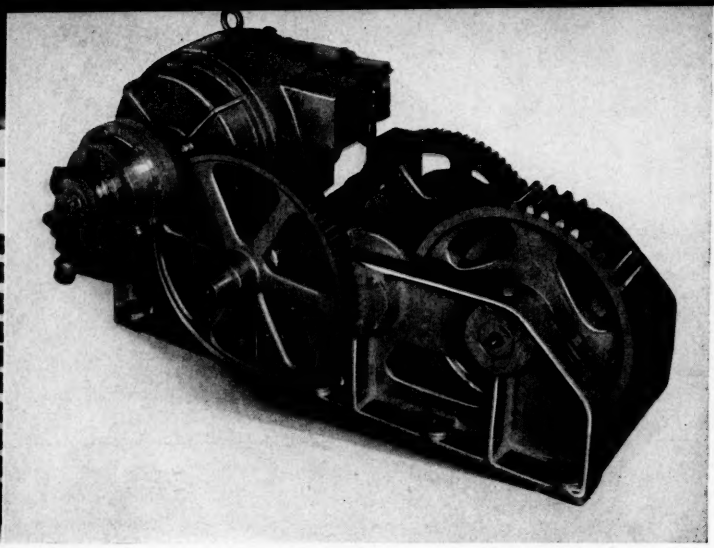
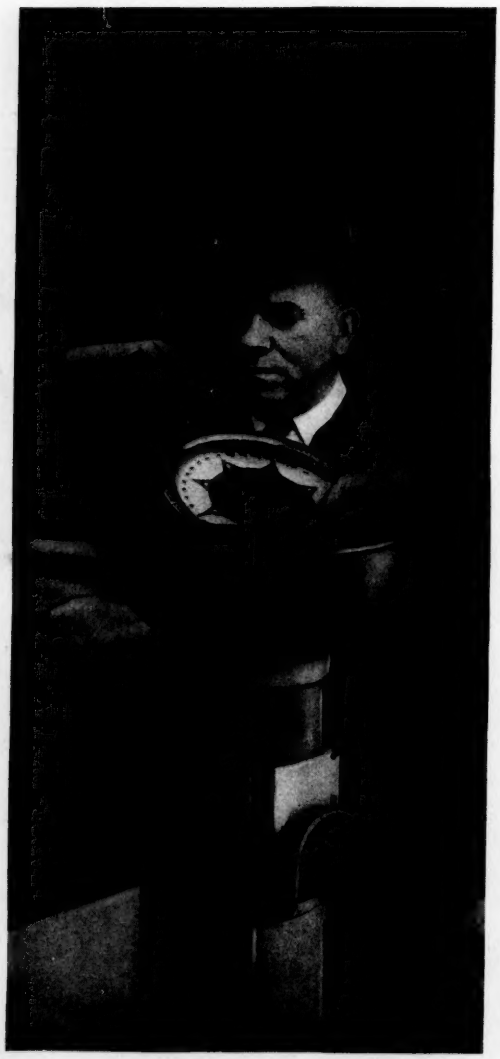




The Electro-Mechanical Steerer installed in the wheelhouse of the USS Bear (left). The steering engine for this equipment, shown above, is suspended from the ceiling of the Bear's engine room



Harry J. Campbell, Sperry Service Engineer, at work on the North Star's repeater compass

Thomas C. Poulter, with the data provided by Admiral Byrd's previous expeditions has been able to solve all these points.

In order that the Expedition may carry out the surveys which are an important part of their duties arrangements have been made to add to the cruiser itself an airplane capable of taking off from the smooth snow and making aerial photographs of territory around the cruiser or in case of dire need of carrying its personnel to safety. Moreover it has equipped this amazing vehicle with means of maintaining constant radio communication with the rest of the world.

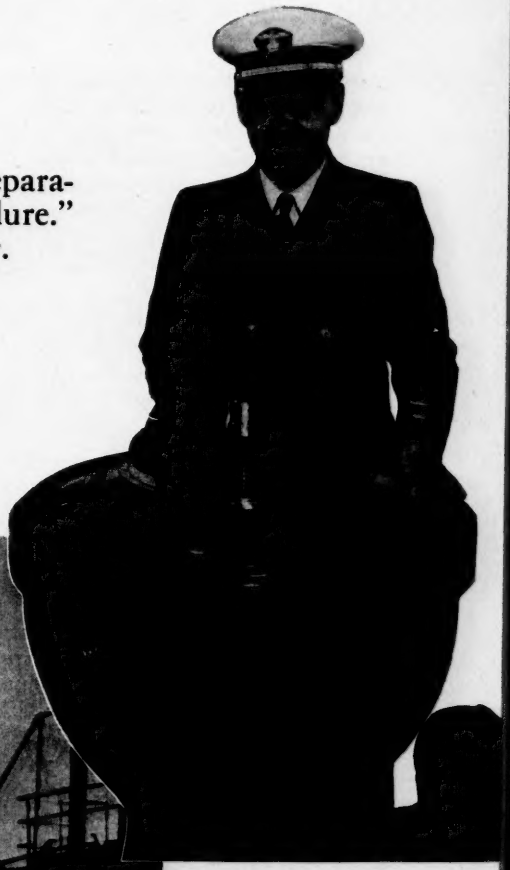
But such a vehicle with all its technical equipment would be of little use to Admiral Byrd and the scientific world if it could not find its way in as straight a line as surface conditions permit. Obviously the magnetic compass is of no value at the magnetic pole and for some distance around. In the whole of Antarctica its directional force is notably less than at greater distances from the magnetic pole. In the long Antarctic night, in an area of snowy plains devoid of landmarks, it would be impossible to steer a practical course except by the stars. The procedure followed on previous Byrd Expeditions was to build a series of snow beacons with candles burning in them for a light source. By lining up two of these beacons they, were able to proceed on a straight course, building additional beacons as they advanced. If the present Expedition were forced to use that laborious and time consuming method with the snow cruiser, their speed would be reduced to a fraction. The cruiser has, therefore, been equipped with a Directional Gyro, the first time, as far as we know, that this instrument has been installed in an automobile. The Expedition will use the sun compass during such time as the sun is available. This will provide the essential factor for setting the Directional Gyro during that period of the year when the sun is visible. During the Antarctic night astronomical control will have to be made by stellar observation. The Directional Gyro will be in use under conditions in which no other instrument would serve.

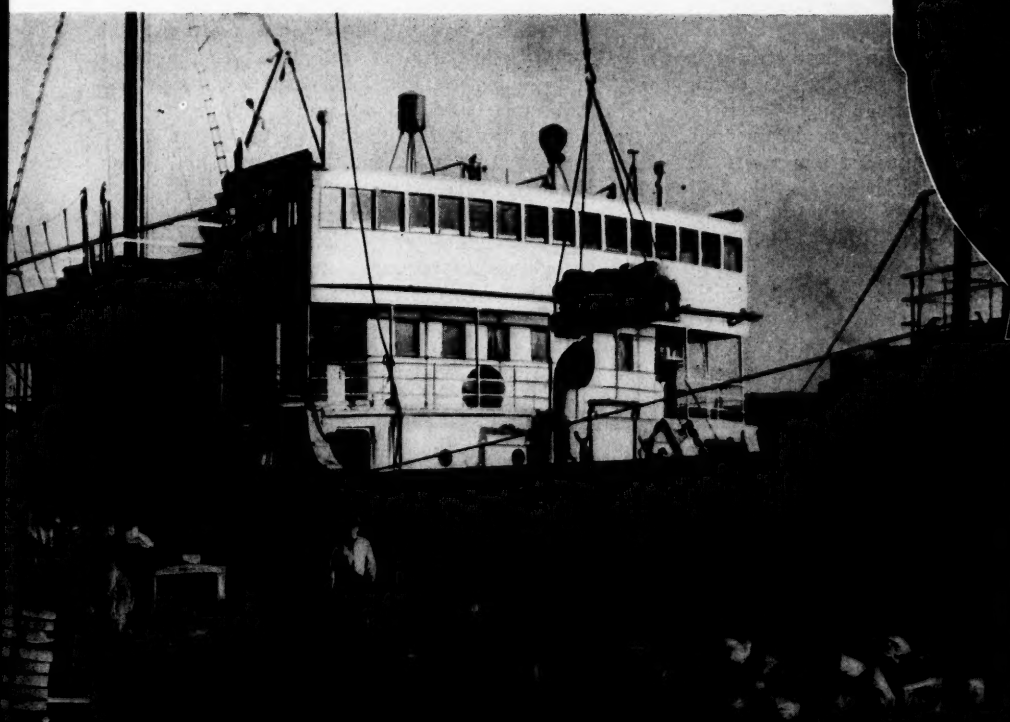
The snow cruiser is 55 feet long and 15 feet wide, requiring a road space usually allocated to two automobiles. Unlike the infinite variety of tractors with which we have become familiar in recent years, which negotiate rough going by self-laid tracks, it depends for trac-

tion upon four grotesquely enormous rubber tired wheels. Their versatility would be the motorist's delight if it were attainable in an everyday car. Motive power is provided by two 150 horsepower diesel engines, each connected to a traction type General Electric generator. Either or both of these engines may be used at any time so that the vehicle may cruise with one engine but instantly apply the other when additional power is required. Most important factor of this power plant is the fact that each wheel has its own electric motor so that any wheel may be turned at such speed and with such power as may be required to meet any difficulties. Furthermore, steering may be applied to either the front or rear wheels or both, making it possible to turn on what appears for so large a vehicle a very narrow radius, or to turn both the front and the rear wheels as much as 25% to one side only and move crablike to either side. What a help this would be in some parking problems.

The Beechcraft plane carried on the back of the snow cruiser will depend upon the diesel engine exhaust to warm up its motor prior to starting out on the frequent exploratory and photographic flights which it is planned to make. The real work of exploring and photographing the country rests rather with the plane, with its wide field of vision, than with the cruiser, which becomes a sort of mother ship, though it can be brought into the field of aerial mapping. Its position can be astronomically determined with accuracy, and with sights on mountain peaks made from the cruiser, will provide a necessary fix for accurate mapping. Sperry Gyro-Horizon and Directional Gyro are part of its navigational equipment, for however big the snow cruiser may appear in congested traffic between Chicago and Boston, it will be only a tiny speck in the Antarctic wastes of snow when the Beechcraft makes its survey flights.

"In all things, success depends upon previous preparation and without such preparation there is sure to be failure."
—*Confucius.*





USS North Star taking on provisions for the Expedition. Above, Captain Isak Lystad of the North Star and her Gyro-Compass

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A Review of Camouflage Literature

By Lt. Colonel W. P. T. Hill, U. S. M. C.

Part II

In part I of this article which appeared in the Marine Corps Gazette for November, 1939, various articles covering the basic principles of camouflage were reviewed. In part II herewith, camouflage for Field Artillery, Tanks, Motor Transport, Chemical Warfare, and Airdromes are reviewed. A review of the present French Doctrine on camouflage as well as other foreign articles will appear in the next issue of the Gazette.

Painted Ships. Anthony Ordway, October 20, 1938. *Ken, Inc.*, Chicago, Illinois.

A popular article on the different systems of camouflage used by the several nations during the World War in painting their ships. The article adds nothing to the science of camouflage, however it does give several historical examples wherein painted ships were able to elude hostile submarines by their dazzle coats, or to mystify them as to their course or speed; also relates several episodes wherein the Q-ships were able to sink or capture U-boats.

Camouflage for Field Artillery—Two Views. In two parts. *The Field Artillery Journal*—November-December, 1939. Vol. 29, No. 6. Pages 500-512. Illustrated. 1 map, 8 photographs. Part I.—Captain Peter Rodyenko, Eng.-Res. Part II—Lieutenant R. S. Arnold, C. E., U. S. Army.

In part I Captain Peter Rodyenko discusses the recent First Army Maneuvers at Plattsburg, New York, where he served as Camouflage Officer for the First Army. He deplores the fact that "Protection against hostile observation seems to be one of those many lessons, which, having been learned in warfare, are forgotten in times of peace," which fact was apparent in the First Army Maneuvers. He is a brave man to make such frank statements as the article contains, but the reviewer feels that Captain Rodyenko's criticism is well founded and is made as constructive criticism in order to rectify the serious situation as to the lack of "protection against hostile observation," during the maneuver as pointed out in the article. The many episodes related seem to bear this out. He points out that "terrestrial (occasionally) and aerial" observation must be guarded against, and of the two "aerial photographic observation presents a more difficult problem" (than visual observation). The use of oblique photographs, the taking of same, filters, etc., and states "color photography is not yet sufficiently simplified to be of practical value in the field" which statement does not seem to be borne out in actual practice; however, no exception will be taken to this statement until later. Then the interpretation of air photos is discussed and the lack of individuals who can correctly do this. The stereoscope and its use is discussed and many good "kinks" and "quirks" are given to assist in *reading* air photos.

Shadows, texture and tracks in air photos are discussed. Natural cover, neatness and regularity, natural materials, the use of the 36′ x 44′ camouflage nets and dummies in camouflage are discussed.

The article ends up by pointing out in camouflage that "plain common-sense combined with some training in judging terrain as regards the possibilities of natural cover it offers" and "It requires, however, practice and experience which must be acquired in time of peace, and not left to the last moment." An excellent article throughout and one of the best recently turned out by him.

Part II, by Lieutenant R. S. Arnold, C. E., U. S. Army.

The article begins by stating—Recent tests of camouflage materials "has shown that the old camouflage principles are still entirely correct but that there are many tricks in their application which do not appear in books. Tests have resulted in the development of camouflage materials better than the present standard ones."

"Camouflage discipline means the difference between success and failure in concealment and is even more important in its relation to other camouflage considerations than doctrine indicates. It begins with reconnaissance and ends only when the position is abandoned." "Instructions should be given to a good noncommissioned officer, who should wire in roads and paths *BEFORE* the guns come up; and a camouflage guard should be posted *BEFORE* the arrival of the battery to see that no trucks or persons go outside wired roads and that pieces are unlimbered at the proper points and manhandled into positions." "Camouflage discipline does not end with wiring paths and roads and keeping personnel and vehicles within wires. It includes keeping fresh foliage in the nets when natural camouflage is used, keeping trucks from stopping at the battery, and thus giving away the position, and doing all cutting of camouflage material at a distance from the position." "It also includes keeping rear echelons under cover, avoiding production of smoke from kitchens during daylight, forbidding unnecessary use of lights at night, and general maintenance of the position, such as keeping spoil under the nets and nets taut."

In the use of nets or chicken wire and their maintenance with garnishings, Lieutenant Arnold gives some excellent advice. "Choice of camouflaged material is of less importance than discipline and choice of position. Natural materials are available locally, simplifying the transportation problem, and foliage is always the proper color whether panchromatic, color or infra-red film is used for aerial photography, or the position is being sought by an aerial observer." "The best camouflage material is uncut foliage; every effort should be made to use it," "although

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it must be replaced frequently in the summer as the foliage wilts in a few hours in the sun and looks different."

The use of strips of artificial materials such as jute, and domestic cotton goods such as "OSNABURG," for garnishing is discussed, as is the use of oil and cold-water casein-bound paints for camouflage. In discussing cold water paints he states "these paints are non-combustible, require only water for mixing, do not shine and are available in a wide assortment of colors. "Mural-tone," a casein-bound cold water paint in paste form, has been found satisfactory. Its main disadvantage is that materials dipped in it must be dried in the shade, and hung up vertically because the pigments tend to separate if dried too fast or if the material is horizontal."

" 'Mural-tone' can also help to make concealment more simple by using it to paint vehicles, guns and other equipment instead of the commonly used lacquer. The latter reflects so much light that frequently a gun can be seen right through a garnished fish net."

"The color with which the artificial material in the fish net is painted seems to be more important than camouflage doctrines indicates."

"Artificial paints have a serious disadvantage in the green shades in that they do not reflect red and infra-red rays to the same degree as natural foliage."

A short discussion of snow camouflage is given.

The article is excellent throughout and should be studied by all interested in present day camouflage.

CAMOUFLAGE TODAY. "NOTHING UP MY SLEEVE." Lieutenant James D. Wilmeth, Infantry. *The Infantry Journal,* May-June, 1939. Vol. XLVI, No. 3. Pages 279-280. Illustrated.

Lieutenant Wilmeth points out in this article mainly on the camouflage of tanks that "The best camouflage is natural concealment," and "The eye is more sensitive to angular objects than to smoothly sinuously curved ones. In recognition of this World War tanks were painted in varicolored hues scientifically computed to defeat human recognition by the human eye. The futility of this method of camouflage has long been known, for the paint has never been developed that will change the shadow cast by a tank. Other evidence of its inefficiency is the absence of any similar employment in nature, unequalled in its application of camouflage."

"It is evident, then, that the man who would hide his tank must accomplish these things; he must color it so that it blends with the background. The exposed color must have the same "texture strength" as the background. The shadow must be concealed or reduced to an unsuspicious, irregular blot."

"The accomplishment of these things suggests use of the background itself—grass, bushes, foliage, or whatever is at hand."

Lieutenant Wilmeth states that "A closely meshed 'visi' net has found much favor with operating personnel, probably because it is easy to install." *** "The visinet finds its best use in grassy lands since the meshes are small enough to hold upright bunches of grass. Grass camouflage of this type is very effective but the covering must be changed at regular intervals. In moving situations, however, tanks seldom stay in any one place long enough for the enemy to study photographs taken on several successive days. *Thus camouflage from the eye of an observer is usually sufficient without fresh grass daily."*

"A common mistake (in camouflaging a tank) is to hang this net over the tank and then toss brush on top of it. The net draped thus reveals the angles wherever it touches the tank, and when these angles have ben 'built out' by adding brush to the outside of the net, too dense a thicket is usually formed to jibe with the background. A better method is to fill out the angles of the tank by sticking upright in the ground branches or small trees with umbrella tops, if possible. But whatever is used must match the terrain. These materials must be arranged to give an even flow to the fish net when it is placed over the props. If the net blends fairly well with the materials used underneath, no further covering on top is necessary except whatever is necessary to wash out shiny spots that have been overlooked underneath; then its outside must be broken up by material of the proper color and texture."

The article further discusses tank-tracks, camouflage discipline relative to tracks, parking tanks and the use of side roads or trails by tanks. An excellent article.

CAMOUFLAGE TODAY "TEXTURE AND SHADOWS." Captain Peter Rodyenko, Corps of Engineers Reserve. *The Infantry Journal,* May-June, 1939. Vol. XLVI, No. 3. Pages 277-279. Illustrated.

Captain Rodyenko, one of our best exponents of the art of camouflage in its true value brings out another excellent article on "Texture and Shadow" in the detection of camouflage.

Speaking of photographs he says, "Colors, of course, do not show on the photographic prints, but difference in reflections or absorption of light show up clearly. If an object reflects light it photographs lighter than one that absorbs it. The *various shades* tell a clear story to the intelligence officer who reads the photographs, showing him what does not fit into the natural picture and may therefore be of importance or danger. Accordingly in the new camouflage, color and design have been scrapped in favor of texture and shadows."

"This technique is based on reflection and absorption of light.*** The texture of the terrain depends upon the type of vegetation that grows there and on similar terrain features. Dense woods throw heavy shadows that photograph black. Sparse growth registers lighter in shade."

"Even slight differences in texture do not escape the photographic lens."

Captain Rodyenko also believes that "an applied knowledge of human psychology is also valuable and sometimes saves a lot of work" (in camouflage) and gives two good examples of this.

He states, "The use of color is not entirely 'out'."*** "It has been proved that the color actually used makes no difference so long as it is not light color."

And finally, "The modern camoufleur has to be an engineer, trained in the scientific facts which impose limitations on the art of camouflage."

THE ART OF CAMOUFLAGE. By Logan E. Ruggles. *Our Navy.* 1 September, 1938. Vol. XXXIII, No. 7. Pages 22 and 23. 4 Illustrations of War Time Camouflaged U. S. Navy ships.

XUM

A popular article on camouflage as used by the Navy during the World War 1917-1918 in painting ships of all sorts.

He describes the early efforts of Naval officers at the Boston Navy Yard in camouflaging the old battleship *Delaware* in order to secure low visibility and later the *Isabel,* the *Puritan* and the *Malay,* the tests under varying weather conditions at sea. The *"Malay* design" was placed on many ships varying in size from subchasers to battleships. The design consisted mainly of a wave effect.

Then painting was carried on "in a maze of various colors, in such a manner that the lines of the bridge and vital parts of the engineering section of the vessel—always looked for by enemy submarines—would be lost."

"Funnels were altered or 'blotted' out with black paint, deck houses were blotted out or badly distorted." A description is given of other changes in the ship's lines by "dazzle paint" of all types of ships.

CAMOUFLAGE FOR CHEMICAL WEAPONS. Captain Peter Rodyenko, Eng.-Res. *The Chemical Warfare Bulletin,* January, 1938. Vol. 24, No. 1. Pages 18-22. Illustrated.

Captain Rodyenko deplores the fact that very little in the way of constructive camouflage has been done in this country since the World War except possibly by individual officers who consider camouflage their hobby.

He points out that China, Paraguay and Bolivia have used camouflage extensively in their recent operations.

This article covers mainly the Chemical firing maneuver at Camp Dix, N. J., in 1937, by the 303d Chemical Regiment. At Camp Dix a battery of four mortars was emplaced in a sparsely wooded terrain which showed only small groups of low growing trees with a few bushes clustering nearby. Each group of trees and bushes had an approximate height of eight feet with a group diameter of about six feet.

The men of the 40th Engineers camouflaged the mortars by creating a few more groups of trees and bushes around the mortars using the same type of vegetation as found on the site, but cutting this several hundred feet away from site and carefully obliterating the cut tree stumps.

Captain Rodyenko remarks that the work was done by the Engineers at night and the next day the officers of the 303d Chemical Regiment found it very difficult to locate their mortars even in broad daylight. The trees and bushes had been lashed to the mortars only with thin wire and twine.

He further points out that cut trees and bushes must be kept fresh by digging them in as deeply as possible and if necessary wetting them down with water, otherwise wilting leaves will curl and show the lower sides.

"Care must be taken to enforce camouflage discipline in all cases as even the slightest track visible in an air photograph from a high altitude will give away the position."

"Regularity of outlines so typical of human handiwork must be guarded against."

"Dummy positions, cleverly arranged, reduce the possibility of hits by drawing fire; yet, they should not be too obvious."

Captain Rodyenko's closing remarks are quite pertinent. "The (camouflage) material * * * will be supplied by the camouflage units of armies and G. H. Q. which also will send out their personnel to act as *supervisors, advisors and inspectors only."*

NOTES ON CAMOUFLAGE TESTING IN TEXAS. Henry A. Finch, Colonel, Corps of Engineers, U. S. A. *The Military Engineer,* Vol. XXXI, No. 176, March-April, 1939. Well illustrated.

An exceptionally fine article covering "The Second Cavalry Brigade in April-May of last year conducted a series of camouflage tests that deserves the attention of Military Engineers throughout the Army. These tests were conducted near Toyahvale, Texas, and were centered around the use of nets of different sizes for camouflaging tanks. All forms of motor vehicles, and machine gun installations in a mobile warfare situation." If more tests like these were conducted and the results as well portrayed to the services at large we would soon get somewhere in the art of camouflage of transport and installations in a similar situation.

"The directive stipulated that camouflage should be tested under, observation both visual and photographic, from the air and from the ground. Aerial and visual observation was to be made, beginning at 10,000 feet (without exact location of the camouflaged units being known to the observers), the observers reports being made (by radio) and the photographs being taken at 500 feet intervals down to and including 500 feet. After the location of the camouflaged unit became known to the aerial observers, the directive stipulated that an additional series of vertical photographs should be made, starting at 500 feet and continuing up to 10,000 feet or until the object could no longer be detected. Oblique photographs were to be taken at 500 feet intervals from 500 feet up to 2,000 feet or higher."

A series of vertical photographs taken in accordance with the directive from 10,000 feet to 500 feet of the camouflaged units are printed with the article as well as two obliques, one at 3,000 feet and one at 500 feet of the same units. As no stereoscopic pairs are shown, the proofs are not 100% conclusive that air photographs are of not much value in the detection of the camouflaged units. Of course if the situation were a fast moving one, then even stereopairs would be of little value due to the time factor involved in developing, printing and delivering them.

The results of aerial photographs and observations are however so conclusive as to when can and what cannot be seen by the observer the results are quoted below for the information of those interested in the subject. "Visibility 40 miles ceiling unlimited: wind velocity 20 miles."

VERTICAL PHOTOGRAPHS

Elevators	Reports by radio
10,000	Unable to pick up any of the four units.
9,500	No change.
9,000	Could pick out a queer square object which might be a truck—not sure.
8,500	The same object still looked like something camouflaged but could not tell what it was.
8,000-5,000	No change.
4,500	Could see a second object about 200 yards from the first object but could not tell what it was.
4,000-3,500	No change.

3,000 Could not identify the two objects mentioned as camouflaged vehicles. Thought they might be tanks.
2,500-2,000 No change.
1,500 Could pick third object between the other two but couldn't identify it.
1,000 No change.
500 No change. (Never found M.E. No. 4.)

CONCLUSIONS AND RECOMMENDATIONS BY CAVALRY BOARD

(a) Vehicle tracks in the vicinity of camouflaged units should be eliminated or avoided;

(b) The covers of vehicles to be camouflaged should be removed to make it easier to break up their outlines;

(c) The net strip panels are especially useful in breaking up outlines and shadows;

(d) Camouflage of cavalry armament can be made much more quickly and satisfactory when nets are available for use in connection with local material afforded by the site;

(e) Each cavalry cargo truck, reconnaissance car, scout car and passenger car should be provided with a thirty-foot net, and two nets of this size for each semi-trailer. Each motorcycle, or motorcycle and side car and each machine gun should be provided with a twelve-foot net to be carried in the regimental combat train." The author concludes: "From the evidence furnished by the report, it seems clear that the military camoufleur is by no means out of the picture."

AIRDROME CAMOUFLAGE (MASKING). Captain Bulvicius. *Musy Zinynas. Military Review of Lithuania.* No. 9. Vol. XXXut. September, 1938. No. XVIII. Pages 370-412. With 24 illustrations (cuts) which are the most practical applications of camouflage to large objects that the reviewer has seen in any camouflage literature, masking or the use of disruptive patterns, and the use of shadows being well covered by the illustrations. Translated from the Lithuanian. An old law is restated thus: "The settings of verified history instructs us that every new weapon immediately procreates for itself a confronting weapon. The incessant confronting weapon of all the falling weapons is camouflage. As all the new weapons progress, camouflage progresses incessantly."

The article points out that camouflage measures used during World War I are no longer applicable in that now a nation at war must not only camouflage its army and installations but due to the progress of the air arm it must camouflage its rear installations in its entire territory such as ordnance and munitions factories and the like both by day and by night.

The article further points out that the Germans, during the World War, built vast camouflaged fields that entirely covered their reserves from air observation and photographs and the French and British were unable to detect their presence. The illustrations (1-11-12) show how this was done. Other historical examples of the use and misuse of camouflage are given; how the French in 1918 built dummy sections of Paris about fifteen kilometers from the real Paris in an attempt to divert the nightly German bombings.

Camouflaging airdromes is divided and discussed under the following headings:

1. Natural
2. Technical

Natural camouflage under the following:

1. The exploitation of light and shadow.
2. The exploitation of atmospheric conditions.
3. The accommodations to service the planes.

In regards to technical camouflage the following is discussed:

1. Augmenting camouflage.
2. Disruptive camouflage.
3. Decorative camouflage.
4. Chemical camouflage.
5. Radio camouflage (Propaganda.)
6. Expedient camouflage.
7. Blackouts.

And lastly:

1. Forbidden camouflage.
2. Misleading or dummy camouflage.
3. Informing the enemy of false facts.

All are discussed in great detail and the illustrations (24 illustrations) show how shadows are taken care of in airdrome camouflage.

As a companion article to "Airdrome Masking" excerpts quoted above, the following German article based on Russian Theories is quoted verbatim in order that the two theories, Lithuanian and Russian may be compared. Evidently this article must play some importance in the eyes of the German Army, otherwise it would not have been given such a full discussion in the *Militar Wochenblatt.*

THE ORGANIZATION OF THE AERIAL ARM ON THE GROUND. By Colonel Nagel, ret. *Militar Wochenblatt,* Berlin, 8 April, 1938. Columns 2626, 2627, 2628. 122nd Year, No. 41. (Translated from the German.)

II. The Protection of Airfields. (Based on Russian Theories.)

Airfields may be attacked:

1. From the air by high or low flying bombers or by powerdiving fighters;

2. From the ground by tank or cavalry units which have broken through the front lines, or which have outflanked the friendly troops; and,

3. By enemy troops, especially units provided for such occasions, which are landed by airplanes or which are parachuted to earth.

The active defense of airfields against attacks from the air is as a rule included in the regular defensive system. Anti-aircraft batteries with listening apparatus and searchlights, and pursuit planes counteracting enemy observation planes and fighters are not always at hand, especially in airfields of minor importance. If, however, such defensive weapons are available, they should be grouped around the airfield to the best advantage. Alarm posts (20 to 30 km distant) usually give the defensive arm sufficient time to prepare for the coming attack (from greater periods of time to at least 3 minutes). As means of transmitting the alarm reserve telephone connections with the communication or alarm centers of the airfield, rockets, etc. Recon-

XUM

naissance flights***) around the airfield at a distance of about 50 to 70 km heightens the possibilities of a timely warning. Also defensive flight formations of pursuit planes on constant duty in the air, or which stand by on the ground twenty-four hours a day will enable the friendly forces to take up operations as soon as the enemy planes appear in the sky. All airplanes in the vicinity of the airfield, that have no other duties at that time, and especially those machines on the airfield itself must participate immediately in the defensive measures. For taking-off and landing operations at night certain sections of the airfield are designated and signals are agreed upon so that confusion and mishap may be avoided.

As a rule the defending forces will be in possession of only light and heavy machine guns, including those of airplanes which were surprised on the ground, and rifles of the personnel of the air arm (mechanics, guards, etc.). Machine gun batteries should be placed about 1 km from the airfield and 1 km apart. Rifle detachments should be in positions 800 m apart in the day time (300 m at night) in a circular formation around the airfield and should be connected by telephone to the communication center of the airfield. A trained reserve of sharpshooters and machine gunners forms the core of such a defense.

Against tank attacks all defensive measures including mine fields should be prepared. To protect the airfield from attacks by larger units, the entire area—airfield and environs—should be mapped and the necessary preliminary measures should be made in peace time as far as practicable.

The alarm system and the organization of the defenses of the airfield, included in which are the chain of command, the division of the personnel as to certain duties, the preparation of sites for anti-aircraft batteries, and the positions of the rifle detachments, must be thoroughly arranged and practiced.

The protection against observation (obscuring):

In the construction of the airfield, in the arrangement of the airplanes on the field, and in the activities on the ground the natural cover must be taken in consideration; that is, the relief of the terrain, edges of woods, bushes, gardens and orchards, rows of trees, etc., as well as shadows of natural elevations and of artificial constructions on the terrain so that the enemy observer will be constantly handicapped in the discovery and recognition of the airfields in question.

In place of natural cover, artificial cover may be substituted. It must be kept in mind that such artificial cover must give the impression to the opposing observers the airfield in question is entirely unsuited for service, or at least, that the airfield is not in use at the time. With this in mind the following suggestions were made:

* * * These Russian views are applicable only during times in which attacks from the air seem imminent.

The natural vegetation should be complemented by planting trees and shrubbery, by covering objectives with boughs and screens, etc. Frames of wire screening in which leaves, straw, or small twigs are woven can be employed in the protection of exposed flanks of horizontal screen netting, and in the protection of targets against discovery from the vertical. Telephones and command posts, small vehicles, etc., can be hidden in grain shocks or hayricks. The landing field should fit into the field system of the adjoining terrain. Sham ditches will give the impression of cultivated fields. Sham roads and paths across the airfield can be made by means of light colored sand or chalk, or by mowing high grass and leaving it dry in swaths. The application of colors is also effective; however, this has not yet been conclusively tried. Hayricks and strawstacks, sham landscaping, letting animals graze occasionally on the airfield, and other deceptive measures are means of deceiving and confusing the enemy observer. Plainly seen runways and machines can be hidden under tenting or netting. Wire connections, paths, traces of vehicles, culs-de-sac, etc., which arouse especial attention should be, as far as possible, underground, or at least be fitted into the existing roadnet. Barracks, tents, wireless stations, positions of anti-aircraft weapons—the entire material and personnel should be obscured or at least hidden in the terrain so that they may not be distinguished from their surroundings. As a protection against the glittering and shining parts of airplanes, vehicles, and other objects, protective netting or paints are of importance.

In Russia the employment of colored smoke screen is strongly advocated. White artificial fog is effective only in snow-landscapes; in contrast, green, black, yellow, violet, or orange smoke screens will cover airfields much more effectively because they fit into the color scheme of the surroundings, of such details as, meadows, plowed fields, grain fields, etc. Artificial fogs and smoke screens should not hinder the actions of the friendly anti-aircraft batteries; also, they must take in consideration such points by which the enemy may orient himself. During the night the darkening is the most important means of obscuring. Only the lights necessary for the signaling service and for the landing operations of airplanes should be permitted, and they too should be reduced to a minimum.

Sham flight formations are also employed in order to deceive and divert the enemy. Such flights are made at a safe distance from the airfield and are furnished with artificial objectives. Dummy flying fields should be established in this connection. Such sham airfields must be partially obscured so that the enemy may note the objects on it without suspecting their artificiality. Whatever is desired to be obscured completely on the actual airfield should be partially in evidence on the artificial one. In this connection the following objects should be considered: distinctive runways, paths, roads, and vehicle tracks, as well as spare parts of airplanes and oil and gasoline drums. From time to time single airplanes should land on such dummy fields in order to strengthen the suspicions of the opposing observers.

The effects of the attacks from the air can be minimized considerably through (1) a wise distribution of flight formations, (2) placing airplanes under protective cover on the edges or in the corners of the airfield singly or in small groups from 100 to 200 m apart, and (3) distributing supplies and munitions, tools and spare parts on different points of the airfield. The supplies, etc., preferably should be placed on vehicles (motor or others) and should be kept under cover at some distance from the airfield. In order that landing fields made unsuitable by bomb craters may be quickly repaired, the necessary material, tools, and vehicles should be available at short notice. For the

extinguishing of fires fire apparatus should be at hand; for neutralizing gas poisons, such as mustard gas, chemicals and apparatus should be in readiness. Bomb and gas proof shelters will afford protection to the personnel.

The pros and cons regarding subterranean hangars are still widely discussed. Thus the French advise strongly against them. They contend that such hangars reveal the plans of the attacking air arm and thus limit the effective range. Furthermore, such underground hangars are veritable traps since the enemy need only bomb the exits and runways in order to immobilize the airplanes still in the hangar. General X (France) makes the observation that such subterranean positions should be confined to the hinterland, that they should be employed to store reserves of munitions, fuel, and supplies.

This, however, does not imply that in the hilly and mountainous country at home, subterranean shelters should not be utilized as hangars, repair stations, or airplane factories.

PROTECTION AND CONCEALMENT OF ARTILLERY. *Field Artillery Manual,* Vol. II, by Arthur R. Wilson, Captain, Field Artillery, U. S. Army. The George Banta Publishing Company, Menosha, Wis. 1926.

Chapter VI, Protection and Concealment of Artillery, Volume II of this Field Artillery Manual, is a resume of all War Department, General Service School, Engineer and Engineer School and A.E.F. publications on Camouflage for Field Artillery.

Captain Wilson's chapter begins with the French sentence, "Une batterie vue, c'est une batterie perdue" (A battery seen, is a battery lost), and points out that "It is the duty of artillery commanders of all grades to require all elements of their commands to take the proper precautions for protection and concealment."

He defines camouflage by quoting—"Camouflage," says Webster's dictionary, "is concealment of the fact that deception is being practiced, or something being hidden," and further states that "this word comes from the French 'camoufleur,' to blind or veil."

He relates several historical examples of the successful use of camouflage in war and describes the camouflage organization used by the Allies during World War I.

Under Methods of Camouflage he divides camouflage into two headings: "Camouflage may be achieved by two distinct methods: (a) imitation (simulation), and (b) adaptation (dissimulation)," and lays down the rules for accomplishing this, as well as those for testing camouflage installations.

Captain Wilson's *Ten Commandments* "for concealment of batteries and other work" is worthy of quotation and are given below:

"(a) By avoiding regularity of form. Avoid straight lines and above all right angles. Be careful not to space the guns regularly or make any regular dispositions.

(b) By avoiding shadows, blending them in with natural shadows, or giving them an irregular outline.

(c) By hiding the guns beneath trees, brush, etc.

(d) By hiding beneath nets, etc., which are erected in such a manner that they are indistinguishable.

(e) By hiding the objects behind screens, which may be recognized as such but which hide the gun or other object from observation.

(f) By blending the works in with the natural surroundings in such a manner that they will be unrecognizable in form, color, or texture.

(g) By eliminating all tracks leading to the position.

(h) By planning a single circulation system.

(i) By avoiding apparent changes in the appearance of the ground.

(j) By making the object look like something else.

(k) By erecting dummies.

(l) By conducting the operations of installing a battery so as not to change the aspect of the locality or, if necessary, make the change so irregular that it will not attract notice.

(m) By keeping activity at the battery down to the minimum by locating kitchens, horse lines, and supports at a distance from the guns and keep at the battery position only enough men to shoot the guns.

(n) By maintaining the camouflage by strict discipline.

A few other essentials to remember are:

(a) Colors that match to the eye do not necessarily match photographically, and it is therefore safer to place the battery in a locality where more than one color exists and then hide the battery beneath a broken colored covering so that the exact shade of color is unimportant.

(b) Camouflage photographs as a blur. Tie in this blur with some natural blur in the terrain formed by bushes, irregularities, old excavations, or any spot where new blurs will not be noticed.

(c) Light-colored soil from excavations is visible under camouflage nets and must be covered with brush, grass, etc., to prevent detection.

(d) Material lying flat photographs light, while material standing on end is full of shadows and photographs dark.

(e) Since aerophotographs are made from a height of 1½ to 3½ miles or even more, work must be planned on a scale in proportion to that distance, and one must think in terms of the perspective of the battery from that distance.

(f) Reduce all works to their least possible dimensions."

Under the heading of "Aerial Photography and its importance in the detection of camouflage," he discusses, 1. Aerial photography and camouflage; 2. Interpretation of aeroplane photographs; 3. The study of air photographs by experts; 4. The importance of light and shade; 5. Texture; and then gives hints as to how different items of military significance may be detected in air photographs.

His section under the heading of, "Selecting Battery Positions," is the most complete the reviewer has seen covering all phases of the subject under practically all conditions that would be met in warfare.

Full and detailed descriptions and instructions are given for the erection of all types of camouflage for field artillery and the materials to be used.

The latter part of the chapter describes in detail all types of protection including field works for field artillery.

An excellent condensed chapter on all phases of camouflage and protection for Field Artillery.

REMINISCENCES OF A CAMOUFLAGE OFFICER. By Aymar Embury II, Lt. Col., Corps of Engineers Reserve. *The Military Engineer,* May-June, 1927, Vol. XIX, No. 105.

XUM

Pages 235-238, with a two-page discussion by Major Howard S. Bennion, C.E., formerly Chief Camouflage Service, A.E.F.

Colonel Embury writes a very touching article on the trials, troubles and tribulations of a camouflage officer while attached to the 40th Engineers (Camouflage) in the A.E.F. during World War I.

He continues by exposing the informality of the camouflage service operations in serving the different divisions (the 26th, 2d, 4th and 77th Divisions) and the 1st and 3d Armies operating at the front in France.

Pertinent excerpts from his article are as follows:

"Use and Misuse of Camouflage"

"It was our universal experience that the artillery commander who used us intelligently, used his other people intelligently. With such officers we had no trouble. They understood the principle of concealment as well or better than we did, and they saw to it that their command exercized the same intelligence with regard to the choice of concealed positions that they did in the choice of defilade positions. On the other hand the grand old officer who handed us that stereotyped phrase, 'this position is taken for military reasons' was the one who used to get our goats, and we would find that his positions were just as bad in other respects as they were for concealment.

One brigade commander, for example, sent word to me that he had been instructed to conceal his position. Would I furnish materials and put it up over his guns? In general, positions cannot be concealed that way. In the second place, his position could not be concealed at all, and I told him that I had very little camouflage material (the exact truth) and it was not worth while to waste is on a position where it would do no good—this as tactfully as I could, to which he said, 'Do you disobey my orders?' I said, 'Yes, sir.' And he said, 'You are going to hear from this.' But I beat him to it. I reported the facts of the case to the corps engineer, adding for good measure that his battery positions were so far from the front that their range of fire was extremely limited, that there were no proper shelter trenches constructed for the men, and that he had placed two batteries of one battalion astride of a hospital, where enemy counter battery fire would almost inevitably fall on the hospital. Within four hours, he was ordered to change the positions, but I had not the status of even a stepchild within his walls after that."

"As a matter of fact, a camouflage officer rarely had trouble with battery commanders. A battery commander learned very quickly that certain positions were apt to draw fire and he was glad enough to have anybody tell him what positions probably would not. The higher officers showed too great a tendency to dictate exact positions to their battalion and battery commanders and often *failed* to keep in touch with *them.*"

Discussion of the above paper by Howard S. Bennion, Major, Corps of Engineers, Chief Camouflage Service, A.E.F.

Major Bennion's discussion is concise and should be read by all who expect to have any contact with camouflage in any way whatsoever.

Quoting him as to the status of Camouflage Officers with divisions. "I must frankly admit that actually there was, in many cases, confusion; although officially none existed. According to G.H.Q. orders, camouflage was made a function of the Engineers, the unit engineers were made responsible for camouflage work in their organizations, and all camouflage personnel attached thereto was under their direct command. In practice it worked out that the aggressive division engineer took hold of the camouflage troops assigned to his division, looked after them in so far as necessary, supervised their operations, and left no doubt as to their status in the division. But there were division engineers who took little or no interest in this work and assumed no responsibility with respect to the camouflage personnel attached to the division. Instinctively, the camouflage officer with such an organization turned to the official who gave him the most consideration and support, who in a number of cases was the artillery brigade commander; or he looked to the corps, or army camouflage officer, or to me for instruction or support, and put little or no reliance in the division engineer."

"The tendency to carry on independently of the unit engineer was aggravated by the fact that there were so few camouflage officers who had the experience and aptitude which fitted them to accomplish satisfactory results with an organization that it became necessary, during active operations, to shift these men so frequently that they were utter strangers to the organizations with which they were supposed to work. At some periods, these shifts were made every few days, which meant that there was scarcely time to establish any relations with the various headquarters."

He further points out that a special knowledge of the terrain in which the troops were operating was exceptionally valuable to the various camouflage officers; however in several cases personal acquaintanceship with the various officers and those they were working with outweighed this important factor.

"The camouflage service labored under several handicaps in the last war. Fantastic notions as to the character and efficacy of camouflage operations were spread broadcast throughout the military forces by magazine and newspaper writers whose imaginations were inflamed by the subject. When our new divisions went into action they were without any practical knowledge of the intelligence methods or how to combat them. New divisions were moved in so fast during the summer of 1918 that a handful of camouflage troops was inadequate to offset this lack of knowledge. The 40th Engineers tried to make the best of the situation, and sergeants and privates were attached to our batteries of artillery to give them assistance in concealing their guns; and camouflage officers, acting as solicitors, sought to induce the various units to camouflage themselves as well as their various activities." * * *

"Organizations put in requisitions for camouflage material and, on account of their lack of knowledge of the art of camouflage, these requisitions were often ludicrous as to amounts and character of material." * * *

"Experience soon showed us that the matter of selecting a position and of maintaining camouflage discipline, after it had been established, was of much more importance than the matter of camouflage material and how it was applied; so the camoufleurs developed into agents of general safety, going about from organization to organization without authority to order or punish, relying on salesmanship and threats of wrath to come to induce the organizations to

take what seemed to be reasonable measures to protect themselves and adjacent units from the enemy."

"All this was brought about because of the lack of a practical knowledge of the art of camouflage on the part of the Army in general. It was not a satisfactory method of handling the situation, and it is hoped that the next time our Army will have sufficient knowledge of the subject, and will have had such training, that the various organizations will be able to meet the necessities for camouflage without reliance on special troops."

Never was a truer word spoken, Major, and we hope it bears some fruit in the future.

CONCEALMENT OF MOTOR VEHICLES. R. R. Arnold, First Lieutenant, Corps of Engineers, U. S. Army. *The Military Engineer,* September-October, 1939, Vol. XXXI, No. 179. Pages 329-334. 8 Illustrations.

Lieutenant Arnold is well qualified to write such an article as he is the Assistant Executive Officer of the Engineer Equipment Board at Fort Belvoir, Va., and his experience has been gained over a number of years in planning and testing all sorts of vehicular and other types of camouflage. His interest in camouflage is more than academic or as a "hobby," as it includes camouflage from a practical viewpoint.

He states, "Visual observation from the air depends upon the eyes of the observer. * * * He locates the vehicle by its tracks, shadow, shape, color or shine."

"The aerial photograph gives more detailed and specific information. The eye of the camera is not subject to the errors of the human eye and the photograph is a permanent record which can be studied under favorable conditions by experts. As with visual observation, the lower the altitude from which the picture is taken, the greater the detail shown and the greater the danger involved in taking it."

"The best way to detect enemy installations from the air is by a combination of observation and photography."

"The enemy observer or photographic interpreter locates and identifies objects on the ground by shine, color, shape, shadow, and tracks. *The last two are the most important.* Tracks are a guidepost saying, 'This way please,' and shadow a signboard saying, 'Here it is.' Tracks can rarely be concealed. Hence, they must not be made or, if unavoidable, must not lead to any thing important and stop. A confusion of fresh tracks will surely attract the attention of the aerial observer and result in photography and detailed study of the area. Shadows not only betray the presence of an object but tell the experienced interpreter exactly what is present. They are hidden by losing them in other shadows naturally present. Shine and shape are readily concealed by covering the object with whatever is handy and color is taken care of when the covering matches its surroundings. Unfortunately, matching color is not quite as simple as it sounds. Although a field of corn two feet high may be the same color as a field six feet high, the two will not look or photograph the same from the air because of the difference in the amount of light reflected, due to differences in texture. A more familiar illustration is the difference between a new velvet dress and part of the same dress when the velvet has been crushed. In camouflage both color and texture must be *matched.*"

What is really implied here is that relative tone values and their matching or mis-matching in aerial photographs really give away more camouflage installations than anything else.

Lieutenant Arnold then describes the Engineer Board and Infantry Board investigations of the problem of concealing motor vehicles and tanks in which he had a part in the tests and resulting studies. He presents the following conclusions:

"The flat top has serious drawbacks as a means of concealing vehicles due to the fact that wire and about a dozen twelve foot poles as well as a net must be carried and the erection of the high net is difficult and takes considerable time. * * * The size and length of the shadow of the vehicle necessitates a large flat top."

"Drapes," of visinet and fish nets garnished with burlap or visinet of a color similar to the natural surroundings "have a great possibility in effectively camouflaging vehicles as pointed out in the results of the tests under varying conditions."

"The tests hinted that it was easy to hide in woods without leaves because of the confused pattern of light and shadow," however, "vehicles camouflaged the same way as in the previous test (sunshiny day) were easier to see in the woods on an overcast day than on a sunny day. There were no shadows to break up shapes."

"Under most conditions, in country of cultivated fields and small patches of woods, sufficient natural cover will be available to conceal vehicles without using artificial materials. * * * Natural material alone is the easiest and quickest camouflage to put up, it eliminates the necessity for carrying around a net, its color is always correct, and it does away with the danger of having to depend on artificial camouflage when it is not effective. * * * In addition, a vehicle in the next war at about $25.00 per net represents a tidy sum and a considerable supply problem."

"In some country there are no woods but plenty of brush. In this case the best solution is a fish net which should be issued ungarnished. This can be quickly thrown over the vehicle, garnished with brush, and properly used, can be relied on to escape aerial observation and perhaps photography except from extremely low altitudes."

"Artificial material should be used only when necessary."

"The best solution, then, for concealing parked vehicles is to rely, primarily on natural material, cover, and the

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10 years	$1,363.50	$1,150.00	$2,937.00
20 years	2,727.00	2,699.00	5,371.00
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ability of the vehicle to use its mobility to seek this cover. But since sufficient cover to hide large numbers of vehicles is not always available, the engineers must be prepared to issue fish nets, garnished or ungarnished as the situation demands, and must therefore stock some nets in their depots."

"Natural cover should be used to the greatest possible extent. Vehicles should never be parked in the open if they can be put in woods. A truck parked against a bush to break the shadow and covered with a garnished net to destroy its regular shape may escape enemy observation, while one parked nearby in the open similarly camouflaged will surely be seen."

"Vehicles should never be crowded close together, or parked in regular formation."

"Tracks are probably the vehicles' greatest bugaboo."

"The fish net drape, whether garnished with natural or artificial material, must be used with some natural cover to be completely effective. If no woods are available, the vehicle must be parked on the sunny side of a bush so the shadow of the drape and vehicle will be hidden." * * *

"The same technique in garnishing the drape is used with either natural or artificial material. Garnishing is thick in the middle and thinned toward the edges. The general outline of the garnishing is irregular. Natural material should always be thrust through the net so that it will stand erect. This is especially important in summer because the underside of a leaf looks and photographs lighter than the top. Of course natural material must be replaced when withered."

"Two other points should be emphasized." The elimination of nickeled trim and radiators, and lacquered hoods, bodies and cabs. "Obviously the best camouflage may be given away by this shiny surface. Since vehicles must be covered with a flat paint at the beginning of a war anyway, it might as well be done now. Flat paint will resist rust about as well as lacquer and will escape enemy observation much more easily."

It is hoped that if and when a manual of camouflage is written for our armed land forces, Lieutenant Arnold will assist in its preparation.

MARINE CORPS ADVANCE FLIGHT SCHOOL

(*Continued from page* 15)

every pilot owing to the policy and employment of marine aviation.

The present employment of marine aviation and the policy of the Corps makes every pilot in the Marine Corps a potential observation pilot and aerial observer. There are times when it is necessary for a bombing or fighting squadron to perform scouting squadron missions. Naturally in these squadrons there has not been time to train for this employment and so the missions are not always successfully accomplished.

Since all squadrons are spending the greatest part of the training year in teaching their pilots advance flying, it leaves only short periods in which to train for tactical operations. The efficiency of the squadrons can not be in the high state that is required for maneuvers or war. There are no schools available where Marine Corps officers can receive this advance flight training. It would be worth more than the time, effort, and money spent to establish and operate an advance flight school for Marine Corps pilots in order to increase the efficiency of the squadrons. The Fleet Marine Force efficiency as a fighting team would improve by the increased efficiency of the squadrons.

An advance flight school should be established at some locality where the weather permits a high percentage of flying days, where good living conditions prevail, and where there are adequate buildings. The necessary planes, equipment and personnel should be furnished at the outset in order to insure prompt and satisfactory results. Pilots should be sent to the advance flight school as soon as they receive their wings and be given thorough instruction in the subjects outlined above so that upon joining an operating squadron they would need only familiarization with the new type of planes before beginning squadron tactical training. This would enable squadrons to spend most of their entire training periods in the tactical training of pilots and would increase the efficiency to the point where the squadron would be able to take the field ready for wartime operations as required by Marine Corps Order 73.

Any officer other than a qualified pilot that might be detailed to the advance flight school as a student for the purpose of qualifying as an aerial observer should be required to have the following qualifications: At least two years' service in an artillery or infantry organization of the Fleet Marine Force; enough radio practice to be able to send and receive at least fifteen words per minute in numeral letter code.

Did I hear some one mention that each Marine Aircraft Group is to be increased by one bombing squadron which would relieve the scouting squadron of its attack missions? That will ease the burden of the scouting squadron but does not relieve the situation that calls for a school to give advance flight training. You can not get away from the fact that every pilot in the Marine Corps is a potential observation pilot and aerial observer and that sometime in his career he will be called upon to fly an observation mission. If he has had advance flight training covering aerial observation in school he will be trained to accomplish this mission. This alone is reason enough for establishing an advanced flight school to give advance training outside of the squadrons.

THE ADMIRAL GRAF SPEE

(*Continued from page* 21)

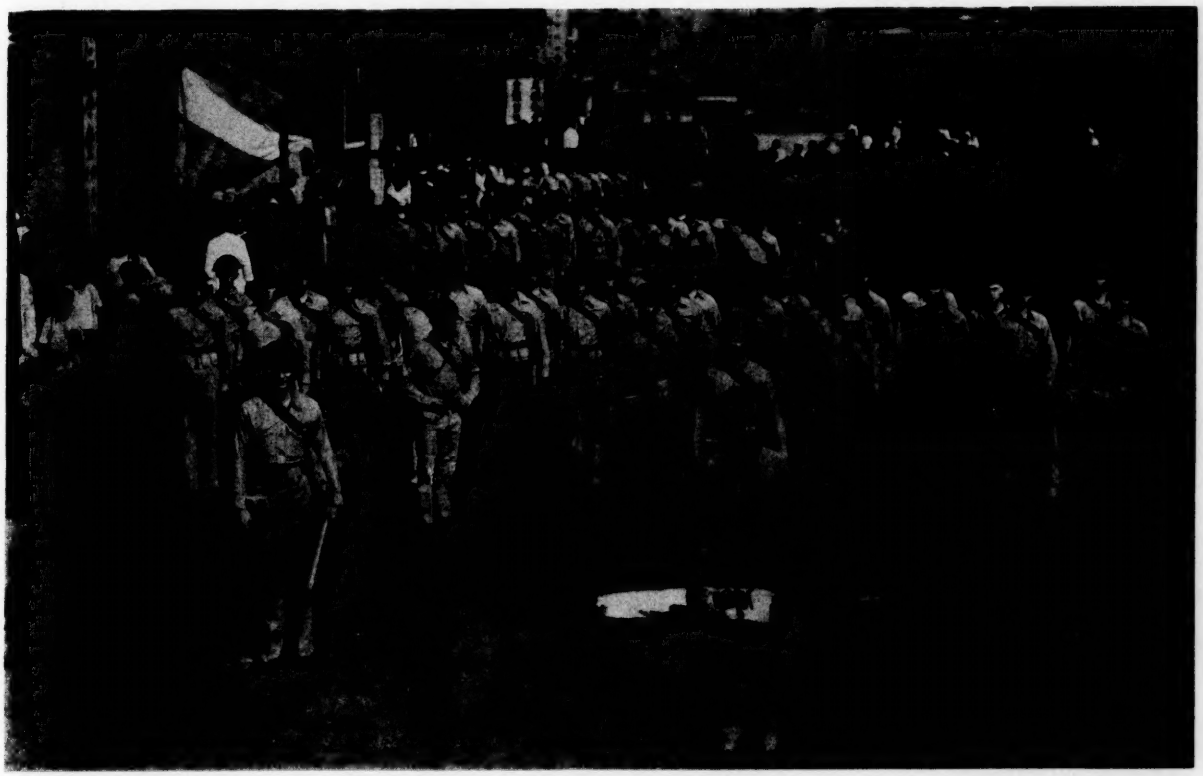
bringing about the action resulting in Sturdee's brilliant victory.

Today, just a quarter of a century later, that historic victory is startlingly recalled to every seaman navigating those same waters, by the way the *Exeter, Ajax* and *Achilles,* Commodore Harwood's three cruisers, reduced the Admiral Graf von Spee's namesake, Germany's newest pocket battleship, to a twisted mass of junk lying in the mud off the River Plate.

NOT U. S. PROPERTY
29959
CANCELED

The Employment of the Marine Rifle Company in Street Riot Operations

By Captain Wallace M. Greene, U. S. M. C.



The Company is Formed

THE field phone rang.

The Major's swivel chair tilted forward to a horizontal position.

"Second Battalion, Major Jones speaking." He listened a moment. "Yes, sir, he is. Just a moment, Colonel, until he cuts in."

The Major turned to the Battalion Commander. "The Regimental Commander is on the phone, Colonel."

The Battalion Commander lifted his receiver. "Blank speaking, Colonel."

"Blank, this is White," commenced the Old Man, "The Police Commissioner just phoned me that a riot is underway in front of the Chu Lin cotton mill on Sinza Road. You remember the place—Japanese owned. The police riot squad and the reserves have been badly mauled. According to the Commissioner this is the worse riot that the police have ever experienced. Been some shooting—both policemen and Chinese killed and wounded. The mob has gone crazy. I want you to straighten the mess out immediately. Keep me informed here of any developments. That's all." There was a click as the Regimental Commander hung up.

The Battalion Commander turned to his Exec. and snapped, "Have 'Assembly' sounded at once. Notify Captain, Company 'G,' to report to me here immediately."

A few moments later Captain, Company "G," reported.

"Captain," said the Battalion Commander, "a mob of Chinese is rioting in the street in front of the Chu Lin cotton mill on Sinza Road. Several policemen and Chinese have been killed or injured. The police can no longer handle the situation. They have called on the Regiment for help. The Regimental Commander has given us the job. I want you to proceed to the mill at once with your company and take the situation in hand. Use whatever

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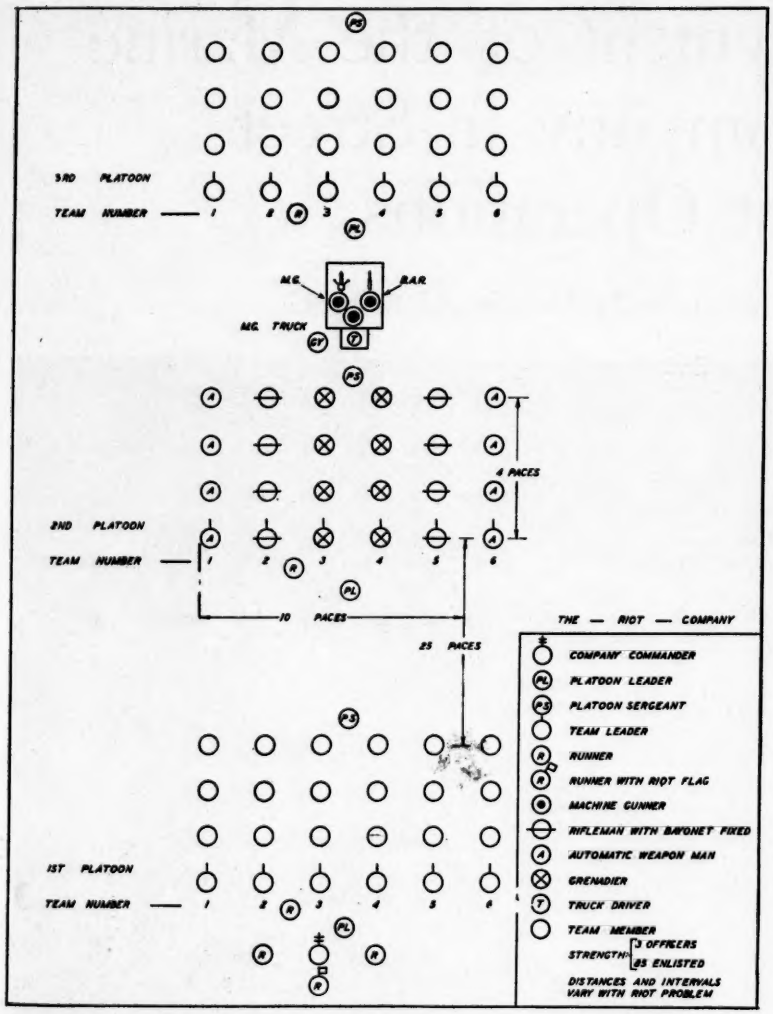


force may be necessary. I know that I can rely upon your good judgment. The rest of the battalion will stand by in the compound. Keep me informed here of your progress. Use city phone or runner."

"Aye, aye, sir," the Company Commander saluted and left. Now—suppose that you were in that company commander's boots. The Battalion Commander expects you to do a good job. What weapons, what formations, what tactics are you going to use against this infuriated mob? Is your outfit organized and trained to act as a riot company? Do your men, your NCOs and your lieutenants know their stuff in a situation like this? And remember—you can't organize, you can't equip and you can't teach while en route to the scene of the riot. You can't afford to muddle through, either. You and your outfit must have a definite plan of action and know how to execute it.

My story happens to have a Shanghai setting but your's may be placed closer home and offer even a more complicated problem on what to do and how to do it than does this one. But here we are back at our company office already. You are Captain, Company "G." What are you going to do?

The following is an illustrated outline of a successful method developed to meet just such a situation. Formulated in 1937 and 1938 it was designed to answer the questions of organization equipment and training of a marine rifle company in street riot operations in as simple and direct a manner as possible.

Please examine the accompanying diagram. The riot company consists of three platoons. Each platoon is composed of six fighting teams of four men each. The teams are numbered one through six from the right flank. Each platoon is commanded by a lieutenant assisted by a platoon sergeant. There are no platoon guides. The platoon leader has one runner. The riot company is commanded by a captain. Company headquarters consist of one gunnery sergeant and three runners. Total personnel of the riot company: four officers, eighty-six enlisted. (This number includes one truck driver and three machine gunners.)

Each man of the first and third platoons is equipped with rifle, bayonet, cartridge belt with one hundred rounds, gas mask and steel helmet. In the second platoon, two men of the first and sixth teams carry Browning automatic rifles. The other two men in each of these teams carry Thompson submachine guns. Extra magazines for these automatic weapons are in the riot truck. The second and fifth teams carry rifles with bayonets fixed. They have one hundred rounds in their cartridge belts. The third and fourth teams are grenadiers. Each grenadier wears a grenade carrier holding eight chemical grenades (CN tear gas). All men in the second platoon are equipped with gas mask and steel helmet. Officers, gunnery sergeant and platoon sergeants carry pistol, twenty-one rounds, gas mask and steel helmet. No leggings or field scarfs are worn.

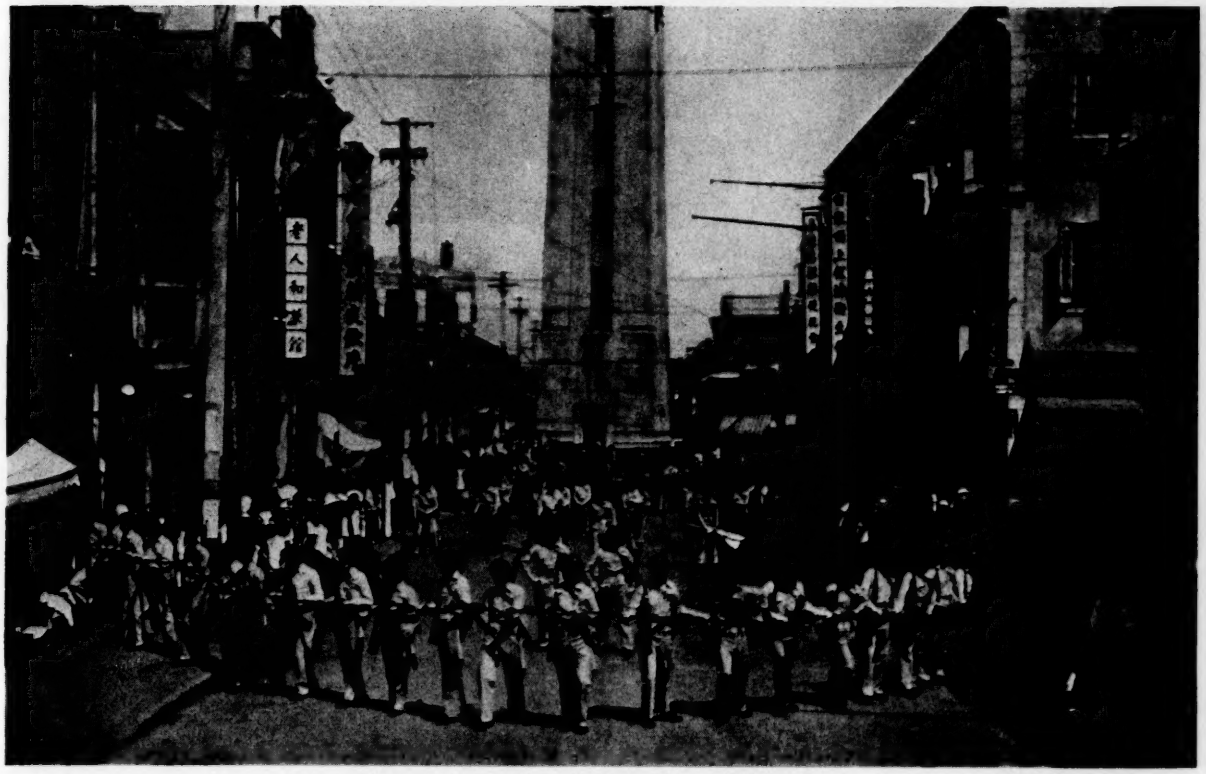
The riot truck is placed between the second and third platoons. It is in charge of the gunnery sergeant. It carries the following personnel and equipment:

PERSONNEL

One gunnery sergeant (in charge).
One driver.
Three machine gunners.

EQUIPMENT

One machine gun mounted.
Ammunition MG—in belts.
One BAR with loaded magazine.
One TSMG with loaded magazine.
Extra loaded BAR magazines.
Extra loaded TSMG magazines.



Clearing a Passage Through a Friendly Crowd With a Rope

Grenadier Teams Forward

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One case .30 cal. ammunition.
One case .45 cal. ammunition.
One riot flag.
Ten flashlights, complete.
Two fifty foot ropes.
Two crow bars.
Four shovels.
Two picks.
Two axes.
Ten extra gas masks.
Ten boxes gas grenades (CN tear gas).
Four boxes hand grenades (HE)
Extra batons (if batons are used).

One of the runners accompanying the company commander carries a riot flag on which is painted in large letters or characters a warning to disperse immediately.

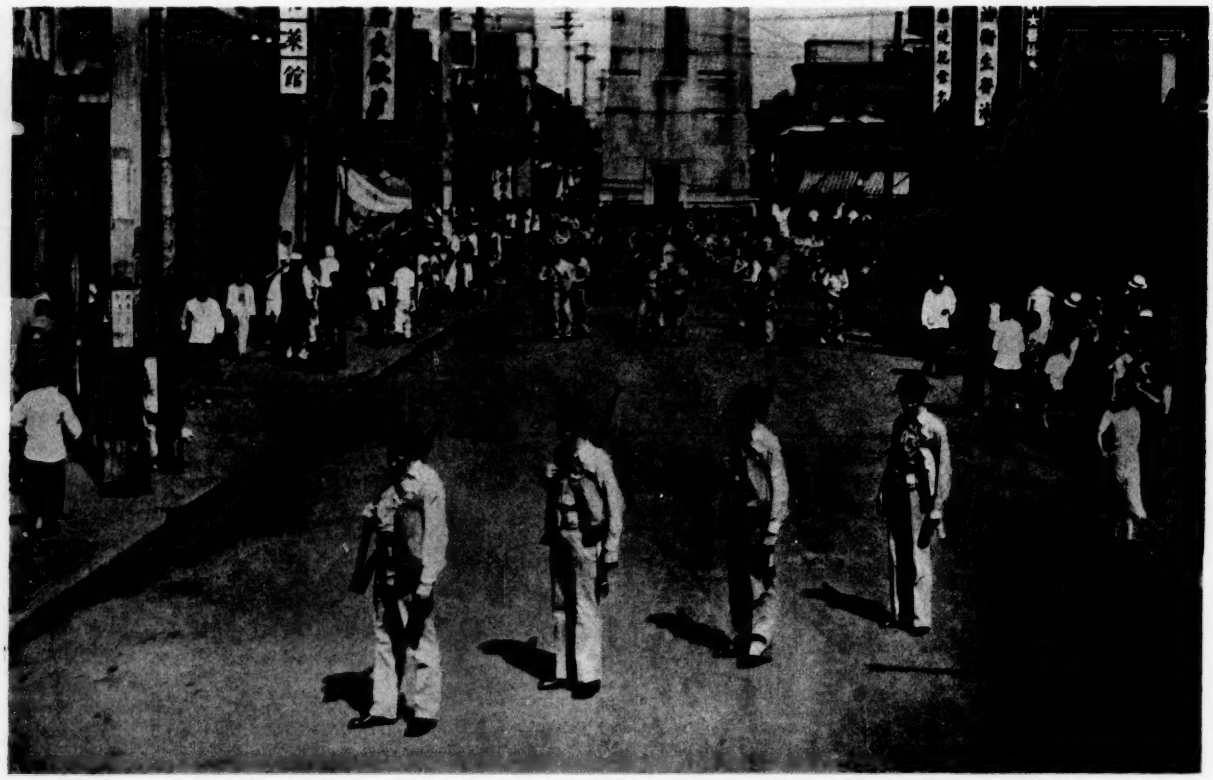
The initial approach formation of the riot company is column of platoons, each platoon in line of fighting teams. The newly-organized marine rifle company is especially adaptable to this formation. A twelve-man squad furnishes three four-man fighting teams or one of the homologous halves of a riot platoon. The approach formation of the riot company is kept as compact as possible. The riot truck follows immediately behind the second platoon.

Prior to sighting the mob the riot company is halted and placed in riot formation. This is accomplished in the following manner. Gas masks are adjusted. The second and third teams of the second platoon move to the front around the right flank of the first platoon. The fourth and fifth teams of the same platoon pass to the front around the left flank of the first platoon. The grenadiers place themselves in line across the street. The rifle teams take position on line in front of the intervals between the grenadiers, forming a protecting screen for the grenadiers. The second platoon leader (with runner) advances with the teams from his platoon. He directs their operations. The platoon sergeant of the second platoon remains behind in charge of the remaining two teams (automatic weapons) of his platoon. This illustrates a general rule of movement for platoon leaders and platoon sergeants.

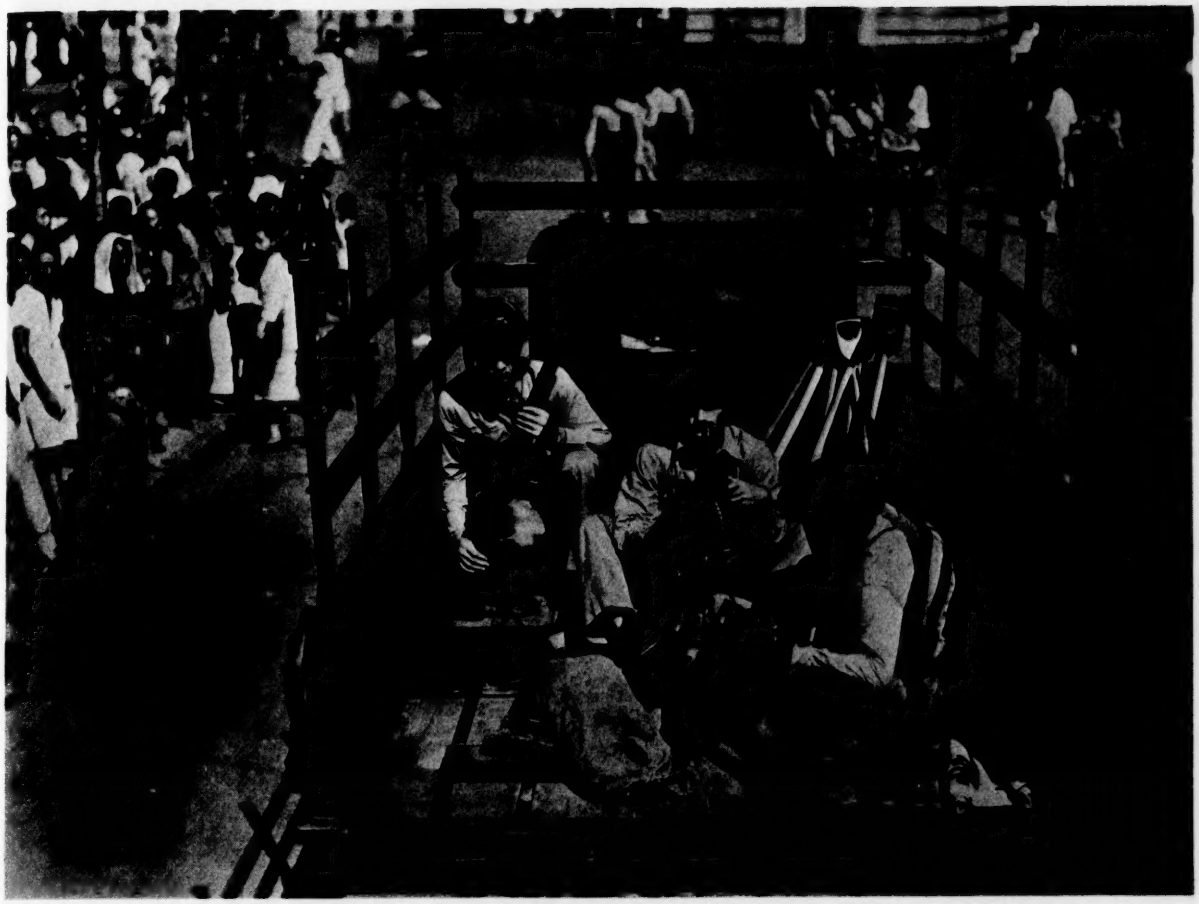
The line of grenadiers and rifle screen having been established, the first platoon is placed in line of skirmishers across the street, first team on the right. The men are placed as close together as possible on this skirmish line. However, be sure to allow them sufficient interval to use their rifle butts. In very narrow streets, one or more teams may have to fall back behind the line. In wide streets one or more teams may have to be ordered forward from the third platoon in order to establish a secure line of skirmishers.

The company commander (with runners) takes place behind the line of grenadiers. From this position he draws from the concentrated strength of his company in the rear and plays it against the mob to his front.

Having been placed in riot formation, the company advances upon the mob. Once the mob is sighted the riot company must not halt. To do so is to encourage the mob to stand. The company moves slowly, but surely, forward upon the mob. From behind the line of grenadiers the riot



The Heart of the Riot Company



Covering a Withdrawal

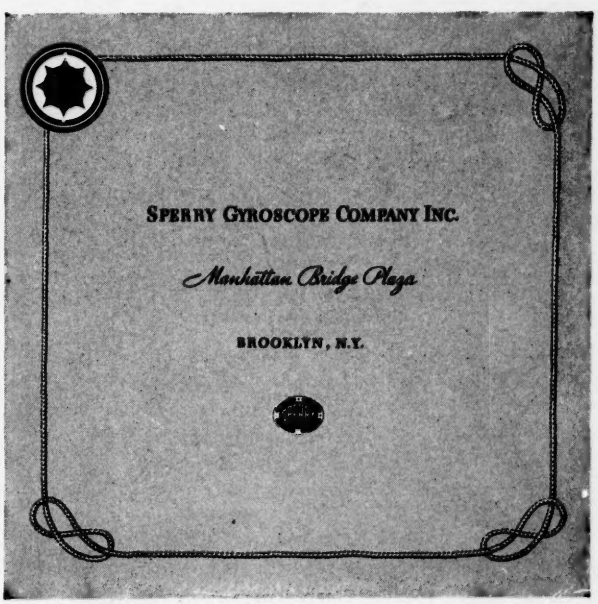
banner is displayed in warning. When it is definitely seen that the mob is not going to disperse, the company halts at grenade distance.

The grenadiers throw grenades. The grenade teams with their protecting rifle teams quickly drop back around the left and right flanks of the line of skirmishers (first platoon). The first platoon charges the mob, using rifle butts to disperse them. (*Note well:* The marine riot company is equipped with rifles instead of batons for two reasons. First: The marine riot company will be called into action against a stubborn and ugly mob which the police have failed to break with batons. Second: The company retains its fire power for any emergency.) The company commander may reenforce the first platoon by ordering forward fighting teams from the third platoon.

In spite of the gas and rifle butts the mob may stand. Some of the marines are down—shots have been fired by the rioters—the crisis in the riot has arrived. The time for diplomacy and tear gas has passed.

The company commander orders forward the automatic weapon teams of the second platoon. They form a line

(*Continued on page 62*)



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Reserve Affairs

By Colonel J. C. Fegan, U.S.M.C.
The Director, Marine Corps Reserve

THE following plans have been approved by the Major General Commandant to cover the below named activities:

The 1941 Appropriations Act carries an increase of approximately $55,000 for the organization and establishment of the 20th and 21st Reserve Battalions. After a survey of the field it has been decided that Los Angeles will be assigned the 20th Battalion and that Portland, Oregon, will be assigned the 21st Battalion. The former battalion will in all probability develop into a West Coast Artillery Battalion.

The following is the schedule of summer training camps:

Bn.	*Home Station*	*Training Site*	*Dates*
1st	New York, N. Y.	Lakehurst, N. J.	21 July-4 Aug.
2nd	Boston, Mass.	Wakefield, Mass.	7-21 July
3rd	New York, N. Y.	Lakehurst, N. J.	4-18 August
4th	Newark, N. J.	Lakehurst, N. J.	7-21 July
5th	Washington, D. C.	Camp Ritchie, Md.	18 Aug.-1 Sept.
6th	Philadelphia, Pa.	Quantico, Va.	7-21 July
7th	Philadelphia, Pa.	Fort Hoyle, Md.	16-30 June
8th	Toledo, Ohio	Camp Perry, Ohio	7-21 July
9th	Chicago, Ill.	Camp Perry, Ohio	7-21 July
10th	New Orleans, La.	Parris Island, S. C.	16-30 June
11th	Seattle, Wash.	Bremerton, Wash.	7-21 July
12th	San Francisco, Cal.	Mare Island, Cal.	16-30 June
13th	Los Angeles, Cal.	San Diego, Cal.	16-30 June
14th	Spokane, Wash.	Bremerton, Wash.	16-30 June
15th	Galveston, Texas	San Diego, Cal.	9-23 June
16th	Indianapolis, Ind.	Quantico, Va.	21 July-4 Aug.
17th	Detroit, Mich.	Quantico, Va.	4-18 Aug.
18th	St. Paul, Minn.	Camp Perry, Ohio	7-21 July
19th	Augusta, Ga.	Quantico, Va.	16-30 June

The Eastern and Western Platoon Leaders' Classes will be assembled at Quantico, Virginia, and San Diego, California, during the period 7 July-17 August. The contemplated strength of these Classes is: Quantico, 350; San Diego, 100.

It is the intention of the Director to inspect as many camps as possible.

The Aviation Division of the Reserve will be inspected according to the following tentative plan:

Opa Locka (Miami), Fla.	March 3, 1940
Long Beach, California	March 16, 1940
Oakland, California	March 23, 1940
Anacostia, D. C.	April 6, 1940
Brooklyn, N. Y.	April 13, 1940
Kansas City, Kansas	April 27, 1940
Seattle, Washington	May 5, 1940
Minneapolis, Minnesota	May 11, 1940
Grosse Ile (Detroit), Mich.	May 18, 1940
Squantum (Boston), Mass.	May 25, 1940

It is believed that this year's summer training program represents the best rounded-out one the Reserve has yet been given. The Commandant's policy is to have Reserve battalions allied during summer training as closely as possible with some activity of the regular establishment. First, it is far more economical for a Reserve battalion to be located in a Marine Post where the ordinary military services are in operation, such as movies, post exchange, laundry, athletic and welfare activities, etc. Second, because it automatically throws Reserves and members of the regular establishment together, whereby the Reserves can by habit absorb post routine and customs of the service. Further, because the installations around barracks and posts are much more comfortable and extensive than those found at temporary camp sites, also the matter of local transportation greatly facilitates the ease with which training schedules can be carried out. The association which is offered between officers of the Reserve and officers of the regular Marine Corps will build up a better esprit.

The training of the 1st, 3rd and 4th Battalions at Lakehurst this year should prove interesting because that is the home of our lighter-than-air on the East Coast, and, incidentally, Lakehurst is not far from the summer resorts of New Jersey.

The 2nd Battalion goes to Wakefield. This battalion trained at Quantico in 1938. The 5th Battalion goes to Camp Ritchie (Cascade), Maryland, due to the kindness of the Maryland National Guard. The 7th Battalion, being an Artillery Unit, will train at Fort Hoyle (Edgewood), Maryland, where the Army kindly extends to us their facilities.

The introduction of the use of Camp Perry for the 8th, 9th and 18th Battalions is a new step and it is hoped that this experiment will prove beneficial and that we may arrange to have it become one of our annual camp sites. The sending of the 15th Battalion to San Diego should be a definite interest to that organization as it has never trained with the Fleet Marine Force. Likewise, the sending of the 10th Battalion to Parris Island should be an added incentive to better that battalion. The 11th and 14th Battalions will train at Bremerton this year, having trained at San Diego in 1939. The sending of the 19th Battalion to Quantico should be a benefit to that organization as this will be their initial training at that post. The 16th and 17th Battalions likewise get their initial training at Quantico with the First Brigade of the Fleet Marine Force. The 12th Battalion will go to Mare Island, where they will find it interesting. The 6th Battalion goes to Quantico and the 13th to San Diego where they will train with the Fleet Marine Force.

KS/A17-32 (400116)
G

DEPARTMENT OF THE NAVY
Washington, D. C.

Jan. 25, 1940.

From: The Secretary of the Navy.
To: Colonel Selden B. Kennedy, U. S. Marine Corps.
Subject: Precept convening selection board to recommend Officers of the Organized Marine Corps Reserve and the Volunteer Marine Corps Reserve for promotion to the grade of lieutenant colonel in the Marine Corps Reserve.

1. A selection board is hereby appointed, consisting of yourself as president, and the following additional members:

Lieutenant Colonel Lewie G. Merritt, U. S. Marine Corps
Lieutenant Colonel Shaler Ladd, U. S. Marine Corps
Lieutenant Colonel Joseph W. Knighton, U. S. Marine Corps, and
Lieutenant Colonel Harvey L. Miller, U. S. Marine Corps Reserve (O).

Major Orin H. Wheeler, U. S. Marine Corps, will act as recorder.

2. The board is hereby ordered to convene at the Navy Department, Washington, D. C., on Feb. 19, 1940, at ten o'clock a. m., or as soon thereafter as may be practicable.

3. Five (5) vacancies exist in the grade of lieutenant colonel in the Organized Marine Corps Reserve. The Major General Commandant, U. S. Marine Corps, will furnish the board with the names of all officers eligible for consideration for promotion to this grade, with the records of all such officers. From among these officers the board shall recommend for promotion not exceeding five (5) officers.

4. Three (3) vacancies exist in the grade of lieutenant colonel in the Volunteer Marine Corps Reserve. The Major General Commandant, U. S. Marine Corps, will furnish the board with the names of all officers eligible for consideration for promotion to this grade, with the records of all such officers. From among these officers the board shall recommend for promotion not exceeding three (3) officers.

5. The board shall be governed by the provisions of the Naval Reserve Act of 1938.

6. The proceedings of the board shall be conducted insofar as may be practicable in accordance with the provisions of Naval Courts and Boards.

7. The following oath or affirmation shall be administered to the recorder by the president of the board:

"You, Orin H. Wheeler, do solemnly swear (or affirm) that you will keep a true record of the proceedings of this board."

The following oath or affirmation shall be administered by the recorder to the members of the board:

"You, and each of you, do solemnly swear (or affirm) that you will, without prejudice or partiality, and having in view both the special fitness of officers and the efficiency of the naval service, perform the duties imposed upon you as provided by law."

8. The names of the officers recommended for promotion shall be entered in handwriting. The report of the board shall be signed by all members and shall certify that the board has carefully considered the case of every officer eligible for consideration, and that in the opinion of at least four (4) of the members, the officers therein recommended are the best fitted of all those under consideration to assume the duties appropriate for the various grades concerned upon mobilization of the Marine Corps Reserve.

9. The recommendations of the board shall be regarded by the members of the board and the recorder as confidential. Upon completion of its proceedings, the board shall forward the record of its proceedings to the Judge Advocate General of the Navy.

/s/ CHARLES EDISON,
Secretary of the Navy.

KS/A17-32 (400116)
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DEPARTMENT OF THE NAVY
Washington, D. C.

February 6, 1940.

From: The Secretary of the Navy.
To: Colonel Selden B. Kennedy, U. S. Marine Corps.
Subject: Change in date of convening of Marine Corps Reserve Selection Board.
Reference: (a) Precept convening Marine Corps Reserve Selection Board dated Jan. 25, 1940, file No. KS/A17-32 (400116).

1. Paragraph 2 of reference (a) is hereby modified to read as follows:

"The board is hereby ordered to convene at the Navy Department, Washington, D. C., on Feb. 14, 1940, at ten o'clock a. m., or as soon thereafter as may be practicable."

/s/ W. B. WOODSON,
Acting.

HEADQUARTERS, U. S. MARINE CORPS
Washington, D. C.

Feb. 14, 1940.

The Board to recommend officers of the United States Marine Corps Reserve for selection for promotion to the grade of Lieutenant Colonel, met at 10:00 a. m., 14 February, 1940, pursuant to the precept and modification thereof, prefixed, marked "A-1", "A-2", and "B".

Present:

Colonel Selden B. Kennedy, U. S. Marine Corps, President.
Lieutenant Colonel Lewie G. Merritt, U. S. Marine Corps, Member.
Lieutenant Colonel Shaler Ladd, U. S. Marine Corps, Member.
Lieutenant Colonel Joseph W. Knighton, U. S. Marine Corps, Member.
Lieutenant Colonel Harvey L. Miller, U. S. Marine Corps Reserve (O), Member, and
Major Orin H. Wheeler, U. S. Marine Corps, Recorder.

The recorder read the precept and modification thereof, prefixed, marked "A-1", "A-2", and "B".

The recorder was duly sworn by the President of the Board.

Each member of the board was duly sworn by the recorder.

The recorder read a letter from the Major General Commandant file No. 1954-90-40, AHA-85-evb, dated February 9, 1940, transmitting the names of the officers

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eligible for consideration for promotion to the grade of Lieutenant Colonel, this letter together with its enclosures (A) and (B), prefixed, marked "C".

The recorder stated that no letters concerning the candidates for selection have been received by the board or by the individual members thereof.

The members of the board proceeded to consider the cases of all officers eligible for promotion to the grade of Lieutenant Colonel, as stated in the letter from the Major General Commandant prefixed, marked "C", continuing their meetings from day to day.

The board having considered the cases of all officers of the Organized Marine Corps Reserve eligible for consideration for promotion to the grade of Lieutenant Colonel in the Organized Marine Corps Reserve, as stated in the letter from the Major General Commandant, prefixed, marked "C", enclosures (A) and (B), and after due deliberation, keeping in mind the directions contained in the precept, reports that it recommends the following officers of the Organized Marine Corps Reserve to be best fitted for selection for promotion to the grade of Lieutenant Colonel:

1. Chester Lawrence Fordney
2. Iven Cecil Stickney
3. Bernard Sidney Barron
4. Stephen Arthur McClellan
5. Chester Julius Peters

The board having considered the cases of all officers of the Volunteer Marine Corps Reserve eligible for consideration for promotion to the grade of Lieutenant Colonel in the Volunteer Marine Corps Reserve as stated in the letter from the Major General Commandant, prefixed, marked "C", enclosures (A) and (B), and after due deliberation, keeping in mind the directions contained in the precept, reports that it recommends the following officers of the Volunteer Marine Corps Reserve to be best fitted for selection for promotion to the grade of Lieutenant Colonel:

1. John DeWalt Macklin
2. Carlton Hill
3. Donald Thomas Winder

We, the undersigned, do hereby certify that:

(1) We have carefully considered the case of every officer whose name was furnished the board by the Major General Commandant.

(2) In the opinion of at least four (4) of the members, the officers herein recommended as best fitted for promotion are the best fitted of all those under consideration to assume the duties of the next higher grade.

The findings were read aloud, in the presence of all the members, and the report was signed by the members and the recorder.

Approved by the Secretary of the Navy 20 February, 1940.

Marine Corps Reserve Policy Board

The following is a list of officers who will compose the Marine Corps Reserve Policy Board which will meet at Headquarters, Marine Corps, on 18 March, 1940, for the purpose of advising the Secretary of the Navy on the formulation of Marine Corps Reserve policies:

Colonel Joseph C. Fegan, U. S. Marine Corps, President,
Lt. Colonel Alfred A. Watters, U. S. Marine Corps Reserve,
Major Iven C. Stickney, U. S. Marine Corps Reserve,
Major Bertrand T. Fay, U. S. Marine Corps Reserve,
Major Clarence H. Baldwin, U. S. Marine Corps Reserve,
Major Otto Lessing, U. S. Marine Corps Reserve,
Major William L. McKittrick, U. S. Marine Corps,
Major William J. Fox, U. S. Marine Corps Reserve,
Major Slater Washburn, U. S. Marine Corps Reserve,
Major Walter W. Barr, U. S. Marine Corps Reserve, and
Major Joseph F. Hankins, U. S. Marine Corps Reserve, Member and Recorder.

The approved recommendations of this Board will appear in the June number of The Marine Corps Gazette.

By authority of the Naval Reserve Act of 1938, the annual Marine Corps Reserve Policy Board will convene for the purpose of introducing and entertaining such matters on the conduct of policy and procedure as the members thereof see fit, making their recommendations to the Secretary of the Navy for action. The Commandant considers the results of the Policy Board to be most important, as it is the major occasion when Reserve officers have an opportunity to discuss any problems of their organizations. As can be seen from the above, the majority of the members on the precept are Reserve officers. This Board will be in session about two weeks, and an open invitation is hereby extended to forward such constructive thought as is desired for consideration by this Board. Recommendations and suggestions should be addressed direct to the President of the Marine Corps Reserve Policy Board, Headquarters, U. S. Marine Corps, Washington, D. C.

The following will be a list of Inspectors-Instructors on duty with the Organized Battalions upon the completion of the present tentative changes:

1st Bn.—Major Alfred C. Cottrell, U.S.M.C.
2nd Bn.—Lt. Col. Emmett W. Skinner, U.S.M.C.
3rd Bn.—Lt. Col. James E. Betts, U.S.M.C.
4th Bn.—Major Melvin E. Fuller, U.S.M.C.
5th Bn.—Major Amor L. Sims, U.S.M.C.
6th Bn.—Major Harry E. Dunkelberger, U.S.M.C.
7th Bn.—Lt. Col. John B. Wilson, U.S.M.C.
8th Bn.—Lt. Col. Walter T. H. Galliford, U.S.M.C.
9th Bn.—Major Max D. Smith, U.S.M.C.
10th Bn.—Major Lester A. Dessez, U.S.M.C.
11th Bn.—Major Prentice S. Geer, U.S.M.C.
12th Bn.—Lt. Col. Wm. K. MacNulty, U.S.M.C.
13th Bn.—Major Donald G. Oglesby, U.S.M.C.
14th Bn.—Major Harry B. Liversedge, U.S.M.C.
15th Bn.—Lt. Col. Maurice G. Holmes, U.S.M.C.
16th Bn.—Major Albert W. Paul, U.S.M.C.
17th Bn.—Major Frederick C. Biebush, U.S.M.C.
18th Bn.—Major Theodore A. Holdahl, U.S.M.C.
19th Bn.—Lt. Col. John P. Adams, U.S.M.C.
20th Bn.—
(Co. "F", 11th Bn.) Major George T. Hall, U.S.M.C.

These changes should be effected by early fall.

It is noted that approximately 50 per cent of the Inspectors-Instructors are being changed this summer. This is due to the normal course of duty assignments. The Di-

rector wishes to express his appreciation for the valuable services these Inspectors-Instructors have rendered and he also hopes that the associations made during such Reserve duty assignments will be lasting.

It has been the policy of the Major General Commandant to assign as Reserve instructors only those officers who have a well-rounded career and who are thereby in position to make their lectures interesting as well as make their experience felt in a beneficial way. The enlisted force who assist these Inspectors-Instructors are carefully chosen for their experience around rifle ranges, offices, on seagoing ships, and also with the Fleet Marine Force.

The Inspectors-Instructors and their staffs should be looked upon in the same light as a student looks upon a professor in college.

Armories

The question of armories is one which has grown to be a matter of constant concern with our Reserve. Every effort is being made by the Major General Commandant to have our Reserve Battalions properly quartered and equipped. The amount of funds allowed annually by Congress is insufficient to carry out this wish; consequently, we will all have to bear this shortcoming and be patient accordingly.

By the middle of April the annual inspection of armories and routine in connection with winter training will have been completed. The inspecting officers have reported that they have found a definite improvement all along the line, notwithstanding the difficulties encountered in the line of competition from other branches of our National Defense Forces. Competition is a healthy thing for any organization and can be overcome only by determined effort. The Inspection Boards also report a definite improvement in the general appearance of the battalions, particularly in the question of shoes.

Each Battalion has its own particular problem and none of the 19 Battalions have virtually the same problems. These problems are entertained individually by this office and every effort is being made to meet them as far as possible, but it must be remembered that our efforts are limited, principally by funds.

The 1941 Appropriations Bill carries an increase for armory rental and this will be apportioned out in the best judgment of this office. In cities where federal and municipal buildings are being constructed, every effort is being made to reserve part of the space therein for the battalion concerned.

Promotion

The question of promotion is, as we all know, a serious problem and it is being given the most earnest attention by this office.

It will be noted that one of the other branches of the Service is cutting down on the number of its Reserve officers who are not manifesting proper interest in their Reserve requirements. This same plan will apply to our Reserve, and preliminary steps are being taken to follow through along this line.

The regulations governing promotions have been changed by Chapter 13, Marine Corps Manual, and it is hoped that professional requirements will be modified in such a way as not to require such an expenditure of time in preparation for promotion as has been required in the past. More credit will be given for annual training.

As a whole, the Reserve for the Army, Navy and Marine Corps follow approximately the same general policies, the latter two being more closely allied than the first mentioned as their problems are more kindred in nature.

General

As usual, the Reserve Rifle Team will organize and train in Wakefield and will be entered in the National Matches at Camp Perry this summer. The keynote of this activity is to build up in the Reserve an adequate number of outstanding riflemen who can be detailed as coaches in the different battalions of our Reserve. While some of these rifle shots do not immediately benefit the battalions from which they were drawn, they will in the near future.

As stated, this year we will have our usual Eastern and Western Platoon Leaders' Classes. This is a splendid opportunity for young men interested in our Corps to become identified with it in case of National demands. The successful ones of these Classes are commissioned in the Marine Corps Reserve and will unquestionably shape up into fine Platoon Leaders.

Regarding the Reserve Officers' School to be conducted beginning on the 1st of April, 1940, thirty-seven officers have to date indicated their desire for assignment to active duty in order to attend this school, and it is expected that there will be several more indicating such a desire prior to the time necessary to issue orders to this duty. It is contemplated that they will be continued on active duty for three months or longer after the completion of the school. While on active duty they will receive the pay and allowances of their rank, based on their length of service. Applications submitted promptly by eligible officers will probably be given favorable consideration.

Plans surrounding the operation of Emergency Recruiting have been working out as anticipated and in view of the fact that this is a subject of restricted matter, nothing more than the progress of same can be mentioned.

Note: This is the first of the quarterly messages from the Director, Marine Corps Reserve, to the field. It should become the habit of Reserve officers, especially those in Organized Battalions, to look to each copy of the Gazette for this information. Accordingly, I urge that a healthy percentage of the officers of the Marine Corps Reserve subscribe to The Marine Corps Gazette so that they can acquaint themselves with these messages. It will be the only way that such news will reach you.

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XUM

Fire Effect

By Captain Melvin Maynard Johnson, Jr., U. S. M. C. R.

"AND we ought always, when referring to infantry, to speak of *fire effect*, not fire power. Because *fire effect* is intimately allied with movement while fire power is a static conception." (Major General George A. Lynch, The Chief of Infantry, in *Infantry Journal*, November-December, 1939.)

Introduction

Earlier in his series of illuminating and profound masterpieces of modern military literature published by *The Infantry Journal*, the Chief of Infantry, General Lynch, spoke of the "marriage of fire and movement in that moving fire which is alone decisive."

Fundamentally, fire effect is composed of fire power coupled with mobility. Included in these two basic elements are several important sub-ingredients. A complete list is submitted:

I. *Fire Power*
   (a) Powerful, versatile, one-man weapons having high potential rates of sustained, deliverable fire.
   (b) Accuracy and range of delivered fire.
   (c) Intelligent control of delivered fire.
   (d) Timely application of fire.
   (e) Adequate supply of ammunition to maintain fire.
   (f) Comparative invulnerability to destruction by hostile counter-fires.

II. *Mobility*
   (a) Weight of weapon—one load not to exceed 10-15 pounds.
   (b) Weight of ammunition—load not to exceed about 20 pounds. (Note: One full Mills belt plus two full bandoleers equals 320 rounds, weighing 20 pounds.)
   (c) Uniform rate of march. The rate of march of all rifle units, including light machine gun and light mortar squads should be based upon and maintained at the rate of march of the fully-equipped, rifle-armed soldier. Two rates of march are not compatible with mobility.

The integration of the above elements will result in the attainment of *fire effect*. Since this is our objective an examination of the above list is in order. In conducting this examination constant consideration must be paid to the *application* of the factors to the more extreme conditions of combat. Combat conditions are never "average."

Factors Affecting the Composition of the Elements

The quasi-professional golfer appears on the links with a heavy bag full of clubs. He uses at least five woods and a dozen irons. The player carries one club at a time, his *caddy* carries the bag.

The golfer has clubs for long range, short range, medium range, high-angle, and flat shots. The green is his area of fire, the cup is his target. Like the commander of the larger echelons he has his g.p.f.'s (drivers). His number two, three, four and five woods are his howitzers. His niblicks are his mortars. His midirons are his 75's. His mashies are his rifles and machine guns, and his putter is his rifle at short range, his pistol, and his bayonet.

Alas, the poor platoon commander, and even battalion commanders can not indulge in such an awesome array. They, like the mediocre public links amateur, must get along with a brassie or midiron, a mashie, and a putter. They, too, must carry their few clubs under their arm.

In a word, the types of weapons of the smaller units must be few in kind and versatile in scope. Moreover, to follow the analogy of airplane engine design requirements, the weapons selected must offer the maximum horsepower per pound, horsepower in terms of fire effect meaning maximum deliverable fire, range, accuracy, and penetration.

The following is a list of the types of weapons from which a selection can be made:

Bayonet
Pistol
Hand Grenades
Sub-machine Gun
(Rifle plus bayonet) (Absorbed in semi-automatic)
Semi-automatic Rifle (plus bayonet)
Automatic or Machine Rifle (bipod)
Light Machine Gun (tripod)
Light Mortar (60 mm.)

Having all of the combat requirements in mind, what should be selected from this list if:

(a) Only one weapon can be chosen.
(b) Only two weapons can be chosen.
(c) Only three weapons can be chosen.

The following answer is submitted:

(a) The semi-automatic rifle.
(b) The semi-automatic rifle plus the light mortar.
(c) The semi-automatic rifle plus the light mortar plus the machine rifle, bipod mounted.

If four were included, add hand grenades; if five add tripod-mounted light machine gun; if six add the pistol; if seven add the sub-machine gun.

Bayonet

With regard to the bayonet, this instrument is rarely used, so rarely that it does not justify its normal weight of one pound. A dagger of half the length and half the weight of the conventional bayonet would be fully as deadly. Such a bayonet can be used on the semi-automatic rifle without subordinating that rifle's fire effect to the bayonet.

The bayonet is essential for night attacks, guarding prisoners, and "threatening the enemy." An example of the latter application of the bayonet is submitted.

During World War I the Americans attacked a town. One battle-maddened doughboy chased a German several blocks. The Yank finally won the race, thrust home with his bayonet, and then had difficulty in withdrawing the blade. A passing officer, seeing the trouble, advised discharging the piece. Whereupon the soldier pulled the trigger.

Comment: The average velocity of a bullet is in excess of 2,000 feet per second. The average velocity of a dough-

boy-propelled bayonet is less than 30 feet per second. Need more be said? Yes, training time has been spent teaching soldiers to *fire their rifles to loosen a bayonet* stuck in an enemy.

Selection of Semi-Automatic Rifle

This type of weapon combines more of the essential characteristics desired to produce fire effect than any other.

(1) It weighs about 9-10 pounds.
(2) It may be used with bayonet.
(3) It can fire in bursts of 8-10 shots in two seconds.
(4) It can fire 8-10 aimed shots in 8-15 seconds, and 20-40 aimed shots in one minute.
(5) It can fire accurate single shots, slow-fire.
(6) It uses the same ammunition as the heavier machine guns and has the same range and penetration.
(7) One soldier can, if necessary, carry this rifle and 320 rounds of ammunition without altering the normal rate of march.
(8) By suitable squad organization, fire control and discipline can be insured.
(9) The rifle-armed soldier is much less vulnerable to hostile fire than a machine rifle or light machine gun crew.
(10) At close range the semi-automatic is almost as deadly as the sub-machine gun because of its high rate of fire.
(11) At medium ranges single aimed shots can be fired rapidly and accurately.
(12) At ranges beyond 600-800 yards the semi-automatic rifle can be fired effectively in bursts. A fully air-cooled semi-automatic rifle fired bursts at a rate of 25-80 shots per minute continuously for 90 minutes, a total of 2400 rounds.
(13) Because of its potential volume of fire plus its portability, it makes possible the timely application of intense fire.
(14) It is excellently adapted for anti-aircraft fire against strafing airplanes.
(15) The following table of accuracy, slow and rapid fire, based upon extensive tests witnessed by, conducted by, or reported to the writer, is submitted:

Table of Accuracy

Semi-Automatic Rifle—Slow and Rapid-Fire

Rifle: Johnson recoil-operated, cal. .30
Barrels: Winchester M70, cal. .30, 24, 22, 20 inch
Position: Prone with rest, or bench rest
Sights: Iron. Peep hole, .050 inches average
Ammunition: Assorted makes, M1, F.A. M2

Range 100 Yards

1. Number of shots per group 5
   Number of groups 11
   Average diameter of groups ..... 2 inches
   Total Shots 55
2. Number of shots per group 5
   Number of groups 10
   Average diameter of groups ..... 1.975 inches
   Total Shots 50
3. Number of shots per group 10
   Percentage of shots in normal spread 85%
   Number of groups 10
   Normal spread, average ..... 2.81 inches
   Total Shots 100

Range 200 Yards

4. Number of shots per group 10
   Percentage of shots in normal spread 80%
   Number of groups 18
   Normal spread, average ..... 4.5 inches
   Extreme spread, all shots, average ..... 7.53 inches
   Total number of shots, 200 yard test ..... 180 shots

Range 600 Yards

5. Number of consecutive bullseyes 14
   Diameter of bullseyes ..... 20 inches

Range 1000 Yards

6. Number of consecutive bullseyes 10
   Diameter of bullseyes ..... 36 inches

Rapid-Fire

7. Target: "D" target, reduced to half-size
   Dimensions of target: 13x9.5 inches
   Range: 100 yards

No. of shots	No. of seconds	Score value	Bullseyes	Diam. of group
10	11 secs.	100/100	10	4⅞ inches
10	15 "	100/100	10	3 "
30	70 "	145/150	25	9 "
35	60 "	173/175	33	10 "
40	66 "	197/200	37	9 "*

*35 out of 40 shots grouped in 6 inches.

Range 200 Yards
Rapid-Fire

Target: Standard "A" and "D."
Dimensions: "A" 10 inches; "D" 26x19 inches.

5 shots	5 seconds	25/25 (D)	5 bulls.	12 inches
5 "	5 "	25/25 (D)	5 "	1 "
5 "	8 "	25/25 (A)	5 "	2 "
5 "	5 "	25/25 (A)	5 "	8 "
5 "	6 "	25/25 (A)	5 "	5.5 "
5 "	9 "	25/25 (A)	5 "	5.5 "
5 "	9 "	25/25 (A)	5 "	5 "

Average—200 yards—35 shots
5 shots in 6.71 seconds. Perfect score, all bulls. 5.57 inches

Selection of Light Mortar

A highly portable type of high-angle fire weapon is essential to combat those elements of the defense whose positions are inevitably defiladed from flat-trajectory fires. Moreover, the light mortar is essential as a means of covering indefinitely located targets, as well as defiladed areas through which an attack may be launched. While many of these missions might be properly left to the heavy weapons echelons, small unit commanders are too frequently without liaison. The problem of helping the squad rests with the platoon and company commanders in a majority of cases.

The rifle grenade was a makeshift weapon at best, limited in range, accuracy, and bursting radius. The new 60 mm. mortar combines unusual long-range, effective bursts with accuracy and reasonable portability. No load exceeds about 12 pounds.

The chief weakness of the light mortar is its comparative vulnerability to hostile fire where suitable protective terrain is lacking. Moreover, it cannot be put into action as rapidly as the semi-automatic rifle.

Selection of the Machine Rifle, Bipod-Mounted

The choice of this weapon over the tripod-mounted light machine gun may be questioned. Attention will therefore be directed to these two types of weapons.

In general, the bipod-mounted gun is magazine or possibly drum-fed. The tripod-mounted gun is belt-fed. All guns in these classes are necessarily air-cooled.

Guns of the tripod-mounted class weigh in excess of 20 pounds without mount. The mount weighs at least 10 pounds or more. An air-cooled barrel is not well adapted to belt feed. Belt feed is not at all well adapted to practical mobility. Such guns require a small squad to attend each, which results in a distinct increase in the vulnerability of the weapon to hostile fire.

Accordingly, the tripod-mounted gun lacks several of the most essential elements required to produce *fire effect.*

The bipod-mounted machine rifle weighs, with bipod, from 13 to 24 pounds. The British Bren is an example, weighing 22 pounds. This weapon is fed from 30-round, top-side mounted, detachable magazines, is gas-operated, and has an auxiliary folding tripod.

The modified Browning Machine Rifle (B.A.R.) weighs about 21 pounds with bipod. This weapon is fed from 20-round detachable magazines, and has a butt-stock rest for fixed fires. The removable barrel of the Bren constitutes its most distinct advantage over the Browning.

The German M34 recoil-operated gun is convertible, having belt or drum feed, and tripod or bipod mounts. This weapon weighs 24 pounds without any mounts.

Even the bipod-mounted guns are too heavy to conform strictly to the requirements. According to General Rowan-Robinson in his book, "Imperial Defense," the British made the mistake in adopting the Bren of not insisting sufficiently upon lightness.

An illuminating commentary on such weapons as the 22 lb. Bren is quoted from a condensed British article appearing in *The Infantry Mailing List* Vol. XVI, 1938, pp. 174, 175:

"In tests to determine the handling of the Bren light machine gun during the infantry attack, certain points were brought out. Originally, this gun was regarded as an integral part of the section, never to be taken away. It was found, however, that the gun rarely could be fired when so used unless the section or platoon to which it belonged was working entirely on its own, or had ample room for maneuver. Further, the action of seeking and occupying good firing positions—usually on the flank—disorganized the sub-units concerned. Riflemen of the section tended to become mere servants of the light machine gun, or else were inclined to forge ahead and leave the L.M.G. and its crew far behind thus weakening and disorganizing the section. If the riflemen waited for the L.M.G., the advance was slowed down; and in the final phase of the attack, the number of bayonet men was considerably reduced through the consequent disorganization.

"In consequence, it was often found that much of the automatic firepower of a rifle battalion was inoperative or could not be employed for covering fire."

A weapon having the general characteristics of the Bren, but weighing not over 13-14 pounds *with* bipod, would conform to the essentials needed to insure *fire effect.*

In the last analysis the so-called light machine gun, tripod-mounted, belt-fed, is too light for heavy work and definitely too heavy for light work. Even the Bren and the modified B.A.R. with heavy air-cooled barrel are too heavy to be fired as rifles, semi-automatically, from the shoulder without mounts or supports.

Possibly the ideal weapon in this category would be as follows:

Weight with bipod: 13-14 pounds.
Barrel, rifle-type: removable.
Full automatic, bolt open.
Semi-automatic, bolt closed.
Adjustable stock rest.
30-40 shot clip or charger loaded magazine.
(Optional: telescopic sight).

The use of the rifle clip for loading directly into the magazine as well as via a special 30-40 shot charger would reduce the weight of the ammunition loads as compared with B.A.R. or Bren-type magazines, and would result also in a uniform loading method within the rifle company for rifles and machine guns alike.

Hand Grenades

These are excellent for very short range purposes. Further comment is superfluous.

The Light Machine Gun

This weapon has already been discussed above.

The Pistol

Essentially this is an officers' and non-coms' side-arm. It would be more useful if it were designed to be used optionally with a holster stock and larger magazine, in which case it would also serve a major part of the function of a sub-machine gun.

Sub-Machine Gun

These weapons weigh 9-11 pounds. No arm having the limited range, accuracy, and penetration of a pistol can justify this weight. Such a weapon is useless against low-flying airplanes. It is only effective up to 100 yards, and lacks effective penetration except against personnel almost entirely exposed to fire.

The sub-machine gun is a highly specialized, limited-purpose, type of weapon. It is chiefly suitable for jungle fighting. It may be compared to the professional golfer's "sand wedge" niblick.

The Rifle

The familiar bolt-action repeating rifle was not included in the list because of the semi-automatic rifle. Unless a machine rifle of not more than 12-15 pounds were available, the rifle ???

The following table gives a tabular comparison of the rifle, semi-automatic, and sub-machine gun:

COMPARISON OF FIRE EFFECT OF RIFLE, SEMI-AUTOMATIC RIFLE, SUB-MACHINE GUN

Type	Weight	Accurate Range	Extreme Range, Effective Bursts	Muzzle Velocity	Max. Rate of Aimed Fire in Seconds	Adaptability for AA Fire	Max. Average No. of Man Hits Per Minute at 200-300 Yards	Approximate Accuracy at 600 Yards
Rifle	9-10 lbs.	600-100 yard	Not adapted	2700 ft. per second	4 seconds per shot	Not well adapted	10 hits per minute	20-inch groups
Semi-Automatic Rifle	9½-10 lbs.	600-100 yards	1000-2000 yards	2700 ft. per second	1 second per shot	Especially well adapted	25-35 hits per minute	20-inch groups
Sub-Machine Gun	10 lbs.	100-150 yards	200-250 yards	810 ft. per second	1 second per shot	Not suitable	Not adapted for accurate fire at this range	Not adapted for fire at this range

VERSATILITY

Why does the soldier need the range, power, and penetration of high-powered rifle ammunition such as the U. S. Army's cal. .30 M1 172 grain boat-tail type?

Because the soldier never knows what terrain he may be required to operate on. In flat, open country with rolling hills he may be fired upon by hostile infantry at 600-1000 yards. Moreover, the soldier may need to defend himself against airplanes and armored or semi-armored vehicles, or may be called upon to fire upon a partially protected enemy under cover behind logs, brush, etc.

The Ordnance Department, U. S. Army, has developed the finest military rifle or machine gun cartridge in the world. No other army can match its accuracy, trajectory, range, and penetration. This achievement is due in large measure to improved powder and a well designed bullet, skillfully combined.

The so-called M2 ammunition was developed to provide a lower-powered, lower-pressured load for target practice on restricted ranges. The breech pressure of M2 ammunition is about 38,000 lbs. per sq. inch, as compared with 48,000-50,000 lbs. per sq. inch in the M1 boat-tail ammunition.

The M2 ammunition is not nearly as accurate as M1 ammunition at long range, it has a much higher trajectory, and because its load consists of a reduced charge of M1 powder behind a lighter bullet, there is considerable unburned powder at the muzzle, hence much more muzzle flash.

In addition to the standard M1 ammunition the Ordnance Department has developed an excellent armor-piercing load, as well as a tracer load which is effective up to 1000-1200 yards.

Armed with a semi-automatic rifle and a beltful of M1 boat-tail ammunition, the soldier has a combination capable of performing the widest variety of missions.

So equipped he is less likely to waste his shots, yet, when targets are presented, he is well-prepared to hit a maximum number from 5 yards up to 1000 yards.

ECONOMY OF AMMUNITION

Well-controlled riflemen are less likely to exhaust ammunition than machine gunners. *Uncontrolled troops are a total loss in any army.* The fact that they are capable of burning up more ammunition in a semi-automatic rifle is of less significance. Either troops are under control or they are not. *Armament does not affect control.*

Controlled riflemen will fire generally on observed targets. The percentage of hits per minute, no shots wasted, is quite amazing. Economy of ammunition does not justify failure to take full advantage of exposed targets.

In the last analysis, timing is economy. If the infantry can *move* quickly to the point of vantage, a few minutes of sudden, intense, accurate, paralyzing fire, may determine the issue conclusively. Surely five or ten, or even twenty pounds of rifle ammunition per man is not too high a price to pay for the attainment of the tactical objective.

Infantry targets are fleeting. A brief high rate of aimed fire is more economical and more efficient up to 500-600 yards than prolonged slow bursts from heavier machine guns. The semi-automatic can deliver a ten-shot burst in two seconds at longer ranges.

CONCLUSION

By way of summary a table is presented giving condensed data relative to the fire effect of semi-automatic rifles and machine guns.

Military development, like all other development, is a series of adaptations to existing limitations, followed by concepts applied to and culled from those existing limitations, followed by the overthrow of prior limitations unrealized because of the tenacity of prior concepts, followed by a gradual comprehension of the innovation, followed by the formulation of new concepts based upon the new and slightly diminished limitations.

Hiram Maxim was told that a machine gun was of no military value in 1885. Airplanes were at first used only for reconnaissance. Confusion still exists regarding the correct missions, if any, for tanks.

Our general conception of automatic fire is predicated chiefly upon the concepts which have resulted from long years of employment of machine guns of limited design, weighing over fifty to one hundred pounds with mounts.

Why *must* tripods be used? Because the heavy guns could be fired no other way.

Why *must* belts be used? The heavy gun could only justify its lack of mobility by an increased capacity to deliver sustained fire. Hence, the water jacket.

Why do heavy M.G.'s fire by indirect laying? Because they are often too vulnerable when fired by direct laying.

Conservatism congealed is catalepsy. Radicalism rampant leads to ruin. For some the task lies in maintaining the present to insure a safe, secure foundation for the tran-

sition into the future. For others the task lies in blazing the trail. Often the pathfinders go astray. Often their blaze leads nowhere. But still they try, and inevitably the trail reaches the next limited objective.

Thus the history of the search by military men for the ultimate in fire effect.

And still the search goes on. Though ours is but a passing phase, it is no less important, most especially to us.

The unsolved problems of today may be merely burned-out embers at the fireside of tomorrow's historians, but upon us they may inflict third-degree burns.

TABLE OF FIRE EFFECT

Semi-Automatic Rifle, Machine Rifle or Light Machine Gun, Heavy Machine Gun

	Semi-Automatic Rifle	*Mach. Rifle or L.M.G.*	*Heavy M.G.*
Ammunition	.30 M1 (or equiv.)	Same	Same
Weight	9½-10 lbs.	Usually 20 lbs.	About 35 lbs.
Weight of Mount	None needed	2-12 lbs.	About 45 lbs.
Range for Effective Aimed Fire	600-1000 yards	600-1000 yards	Bursts only
Range for Burst Fire	1000-2000 yds.	1000-2000 yds.	2500 yards
No. of Shots per Seconds, 100% "Man Hits":			
at 100 yds.	1 per second	100% man hits only by semi-automatic fire	100% man hits not possible by bursts
at 200 yds.	1 per second		
at 300 yds.	1 per 2 seconds		
at 500-600 yds.	1 per 3-4 secs.		
No. of Shots per Minute, 100% Man Hits, Deliverable Aimed Fire:			
at 100 yds.	40-45 per min.	Same only by semi-automatic fire	100% man hits not possible by bursts
at 200 yds.	30-35 per min.		
at 300 yds.	20-25 per min.		
at 500-600 yds.	15 per min.		
No. of Effective "Burst" Shots:			
per Second	4-5	10	10
per Minute	50-65	150-300	250-400
No. of Men Used Per Gun	1	2-5	6-10
Average Volume of Burst Fire per 10 Men per Minute	500-650	600-750	400-800
Vulnerability of Gun to Hostile Fires	Slight	Quite Vulnerable	Extreme
Cost Apiece in Dollars Approx.	$90-$140	$200-$400	$300-$500

THE MARINE RIFLE COMPANY IN STREET RIOT OPERATIONS

(*Continued from page* 53)

across the street between the company commander and the first platoon battling to the front.

The first platoon is ordered back. It pulls out of the mob as rapidly as possible moving aft around the flanks of the automatic weapon line to reform by teams in the rear.

Upon order from the company commander, the automatic weapons open fire, blasting a hole through the mob. The riot company moves forward dispersing and mopping up the remnants of the mob.

In the last extreme the riot truck is turned and the company falls back slowly while the machine gun mounted in the rear of the truck opens fire, covering the withdrawal of the company.

This riot company organization is particularly adaptable to the marine rifle company. Its outstanding features are its smashing power coupled with an extremely fine power balance and ease of control. The company can be split fore and aft into two separate organizations exactly similar in equipment, strength, and ready to function independently of each other. Due to the placement of the first and third platoons which are the initial shock units, the company can reverse the direction of its attack with ease or even operate to the front and rear at one time if necessary. The automatic weapons are so located on the flanks of the center (second platoon) as to cover the movement of the company through the street. The automatic weapons are easily controlled in teams and from their position are quickly available to the company commander for operation in any direction.

An ambulance may be attached to the riot company. It should be placed between the second and third platoons.

The heart of the riot company is the four-man fighting team. Each fighting team leader must imbue his men with the spirit, "FOLLOW ME." The company commander and platoon leaders retain control as long as possible. Maximum control is insured by the compactness of the fighting team organization and the placement of the leaders therein. Fighting teams can be quickly detached on independent missions such as search parties or to hold a street intersection without destroying the basic formation of the company.

The straight line formation supplants the traditional V-formation in all street operations save those against a *friendly crowd* where it is desired simply to clear a passage by pushing. Too many of us are prone to think of a V-formation as a rigid wedge of men when in actuality this wedge quickly flattens out into a line upon hitting stubborn resistance. That is why the latest type of riot tactics calls for simple line formations, simple signals, and strong decentralized control (the four-man fighting team) in emergencies.

Weapons employed by this riot team are the normal weapons of this particular rifle company. Weapons may be varied according to the equipment of the organization concerned and the situation.

All equipment carried on the truck, extra ammunition and batons (if used) should be kept assembled by Bn-4 in a definite location (e.g. the guardhouse) where it is instantly available to the rifle company detailed to riot duty.

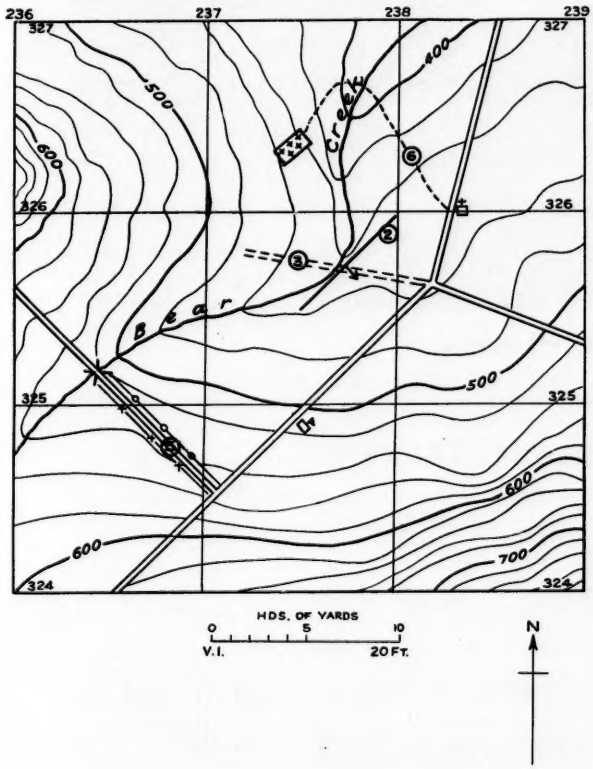
A MAP READING TEST FOR SCOUTS

(*For original problem, see page* 23)

The Solution.

	Co-ordinates	*Elevation*
1. a.	(238.35—326.00)	455 feet
b.	(237.50—324.90)	515 feet
c.	(237.43—326.37)	450 feet
d.	(236.45—325.20)	520 feet
e.	(237.09—324.55)	550 feet
f.	(238.20—325.65)	458 feet

2. See attached map.
3. See attached map.
4. Bear Creek flows generally northeast.
5. See attached map.
6. See attached map.
7. Approximately 1,450 yards.
8. (a) 178 degrees; (b) 100 degrees.



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